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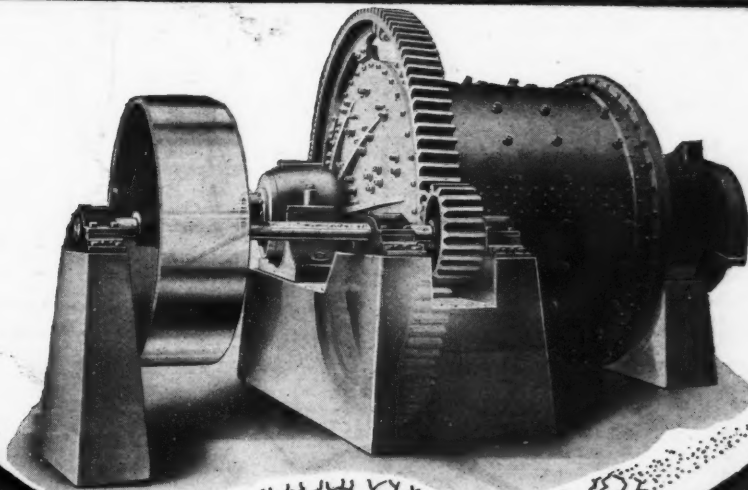
# Rock Products

\$2.00 A YEAR

CHICAGO

MARCH 29, 1919

## TRAYLOR BALL MILLS



With the  
passage of time the  
demand will grow ever greater

FARMERS are awakening in great numbers to the value of limestone as fertilizer. The demand is going to grow tremendously. Get in the game of producing this fertilizer. Even today the demand is greater than the supply.

The Traylor is the simplest and

most efficient pulverizer made. Runs at low speed. Big output per day. Dustless. Requires no screens, and minimum attention. Consumes smallest amount of power per ton of rock crushed. Pulverizes crusher rejections and screenings alike.

Literature for You!

Traylor Engineering & Mfg. Co., Allentown, Pa.

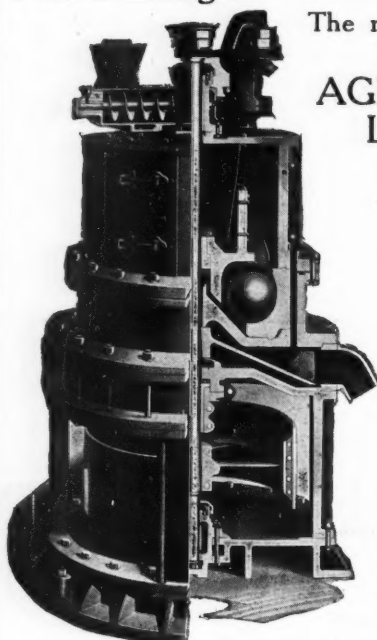
NEW YORK  
30 Church Street

CHICAGO  
1414 Fisher Building

LOS ANGELES  
Citizens Bank Building

SPOKANE  
Mohawk Block

A Complete Self-Contained Unit  
—THE—  
**Fuller-Lehigh Pulverizer Mill**



The most economical mill  
for producing

**AGRICULTURAL  
LIMESTONE**

Reduces lump rock to 20,  
40, 60, 80, 100, or 200  
mesh.

Requires no outside acces-  
sory equipment.

Requires no overhead  
shafts, drives or  
screens.

All material discharged  
from mill is finished  
product.

No inside journals or bear-  
ings.

No inside lubrication.

Uniform feeding system.

Constant and free dis-  
charge.

Low installation cost.

Low operating cost.

Low lubricating cost.

Dustless operation.

Built in sizes to meet the re-  
quirements of your trade.  
Grinds rock to meet the spec-  
ifications of all Agricultural  
Experiment Stations.

Send for Catalog No. 70

**Fuller-Lehigh Co.**

Main Office and Works:

Fullerton, Penna.

BRANCHES: New York City: 50 Church Street

First Nat. Bank Bldg., Parsons, Kans. Chicago: 1336 McCormick Bldg.

**"PENNSYLVANIA"  
Hammer Crushers**



For Crushing and Pulverizing Lime,  
Limestone, Gypsum, Marl, Shale, Etc.  
Main Frame of Steel, "Ball and Socket"  
Self Aligning Bearings; forged Steel  
Shaft; Steel Wear Liners; Cage ad-  
justable by hand wheel while Crusher  
is running. No other hammer Crusher  
has such a big Safety Factor.

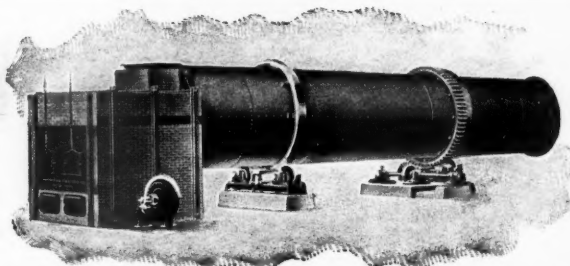
PATENTED

**Pennsylvania Crusher Company**

PHILADELPHIA

New York

Pittsburgh



**DRYERS**

**AMERICAN PROCESS CO.** 68 Williams Street  
NEW YORK CITY

**ATTENTION**

**Cement Manufacturers  
and Supply Dealers**

If you will examine your cement  
that was packed in Jaite Bags over  
the winter months you will find the  
cement in better condition than ce-  
ment packed in other paper or cot-  
ton bags.

Ours Excludes the Moisture

**THE JAITE CO.**

JAITE, OHIO

Sole Manufacturers



**Robins Conveying Machinery**

is handling limestone, clinker, cement in bulk  
and in bags, gypsum, sand, gravel, crushed stone  
and many similar materials. Write for a copy  
of the Robins Handbook of Conveyor Practice  
and learn more about the Robins System.

**Robins Conveying Belt Company**  
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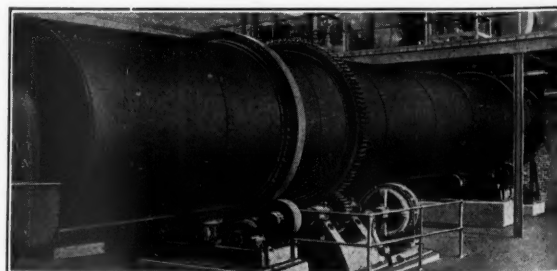
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C. B. Davis Eng. Co., Brown Marx Bldg.

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**Ruggles-Coles Dryers**

for coal, clays, sand, stone, etc.  
They will burn less fuel than  
any other type and with their  
low power and repair costs are  
most economical to operate.



Built to Dry at the Lowest Ultimate Cost

**Ruggles-Coles Engineering Co.**

McCormick Building  
Chicago

50 Church Street  
New York

WORKS: YORK, PENNSYLVANIA

## Special—Trial Subscription Offer!!



This Is the One Useful  
Journal Dealing With

# Lime, Cement, Crushed Stone, Limestone, Sand and Gravel

*and all products of the*

## Quarry, Pit and Bank

This journal covers every phase  
of these industries—

Production, the Selling end, and  
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Technical matter on engineering, oper-  
ation, machinery, etc., is highly prac-  
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multitude of pictures.

Whatever is noteworthy in the industry finds a  
place in ROCK PRODUCTS' pages, with spe-  
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in every issue, arranged  
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more guesswork as to  
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industries.

### Rock Products, 542 So. Dearborn St., Chicago

ROCK PRODUCTS is published every other Wednesday by Trade Press Publishing Corporation, 542 So. Dearborn St., Chicago. Subscription: \$2.00 a year in the United States, \$3.00 in Canada. Entered as second class matter July 2, 1907, at the post office in Chicago, under act of March 3, 1879.

#### CUT OUT AND MAIL

ROCK PRODUCTS,

542 So. Dearborn St.,

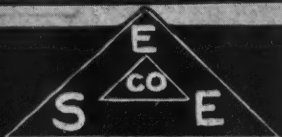
Chicago:

Here's ONE DOLLAR for a special six  
months' trial subscription.

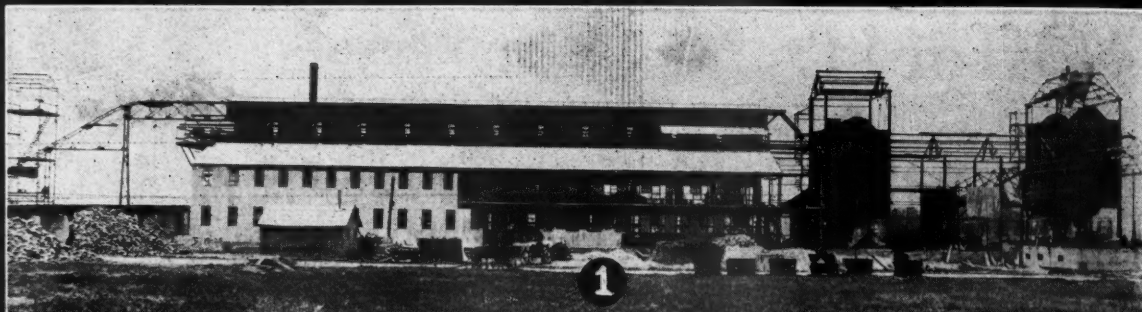
Name .....

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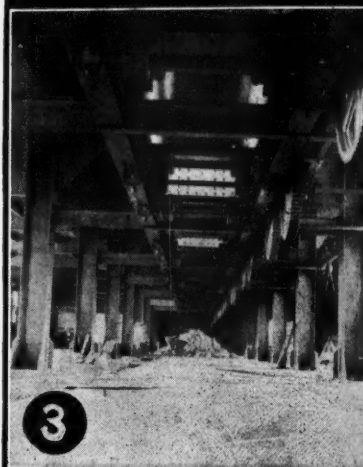
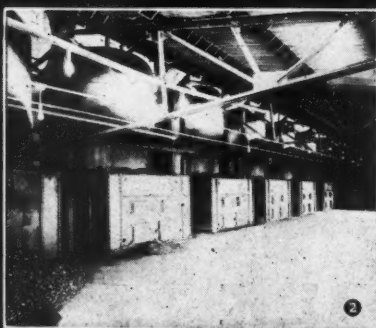
# SCHAFER



**W**HEN you have a Schaffer-designed - and - equipped plant, you have an assemblage of exactly the proper units, working in perfect co-ordination.

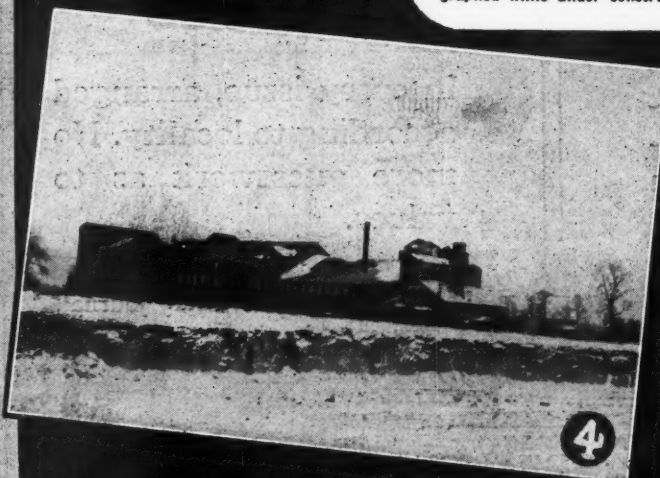
We select equipment according to the individual case. And then fit it together to eliminate all lost motion.

**Schaffer Engineering & Equipment Co.**  
Tiffin, Ohio



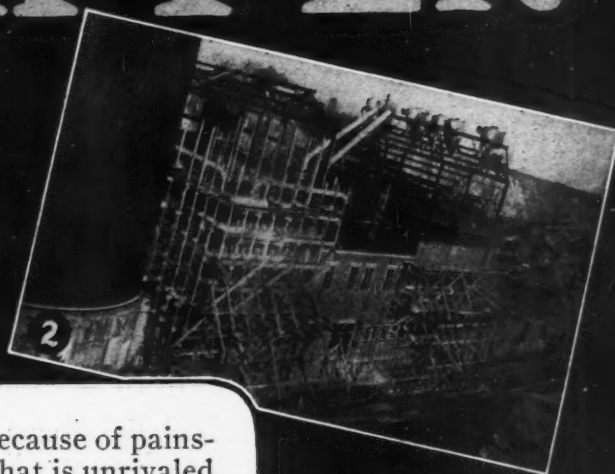
1. Battery of Schaffer Kilns with hydrating plant in which all Schaffer automatic features, including hydrator, are being installed.
2. Battery of Schaffer Vertical Kilns for calcining lime. Records show high capacity—highest grade of lime—smallest fuel consumption.
3. Installation of Schaffer System for cooling and reclaiming lump lime automatically.
4. Schaffer-Crow New Process Lime Calcining Plant.
5. Schaffer Hydrate Plant and Improved Schaffer Kilns.

**NOTE:** Most of the plants here shown were photographed while under construction.





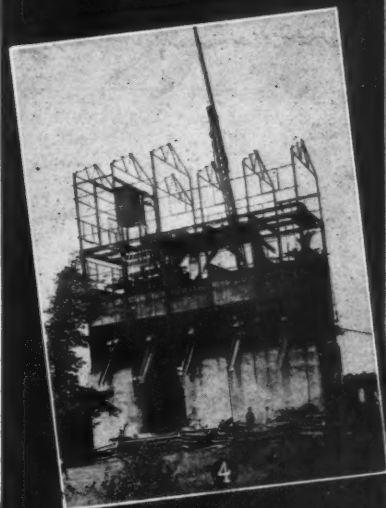
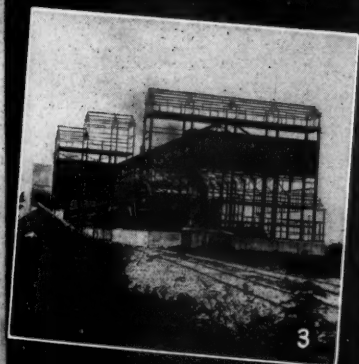
# SCHAFER



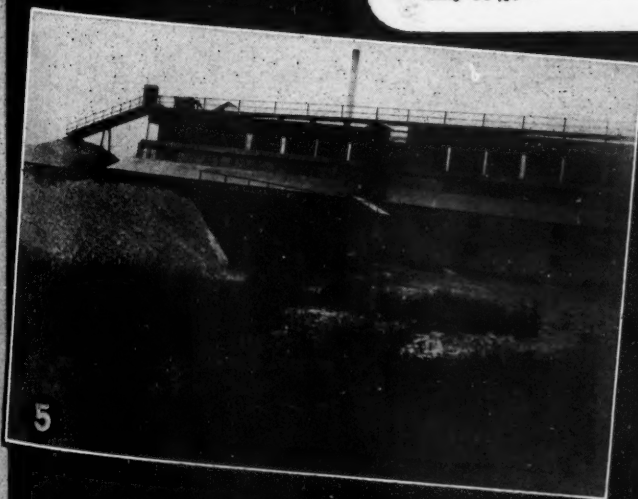
OUR plants—because of pains-taking care that is unrivaled—are always economical producers.

If you will permit us to cite you specific examples of Schaffer plants and what they are accomplishing, you will have proof positive of the value of Schaffer service.

Will you permit us to prove our case?

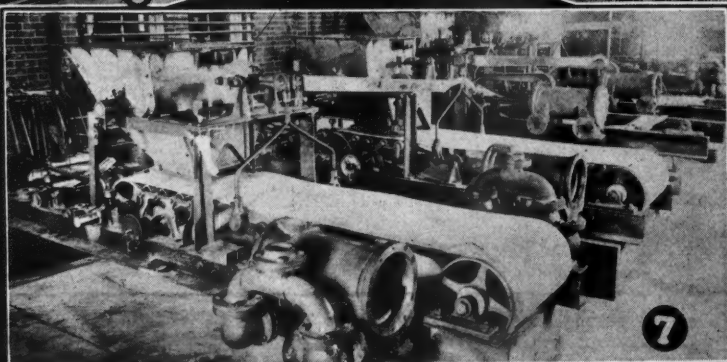
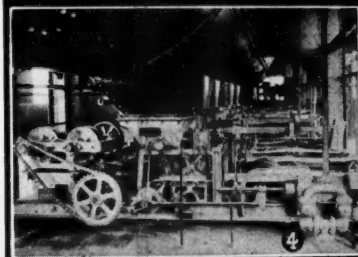
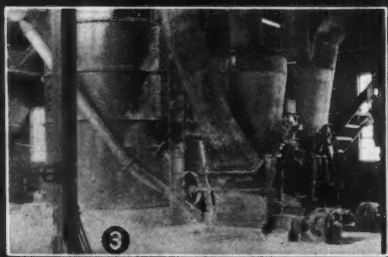
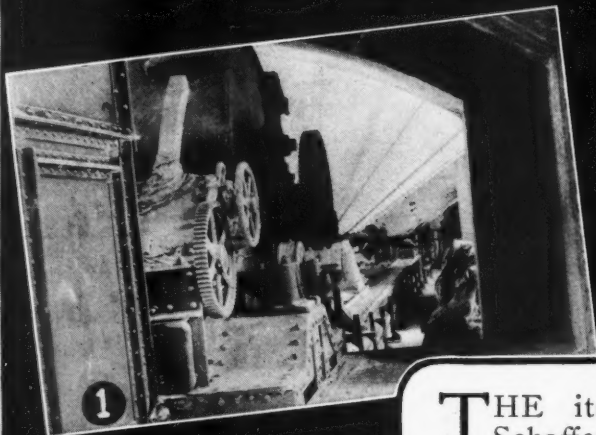


1. Schaffer Hydrating Plant with large quick-lime storages for manufacture of high grade hydrate.
2. Schaffer Hydrating Plant where the production is practically automatic.
3. Double unit plant—rotary kilns for calcining lime. Takes care of all stone in sizes from dust up to the largest, giving a uniform, high-grade product.
4. Schaffer Crushing Plant where stone is crushed in a most simple and economical manner.
5. Battery of vertical kilns, remodeled and refitted with improved Schaffer features, including coal tippie with automatic delivery.
6. 17'x40' Vertical Lime Kiln, remodeled and equipped with Schaffer features, increasing the capacity approximately 50%.





# SCHAFER




**T**HE items comprising the Schaffer line of equipment are rapidly growing. As soon as our engineers devise a better piece of machinery, we produce it—but not until then.

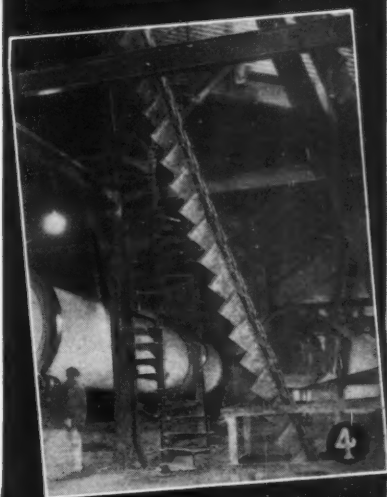
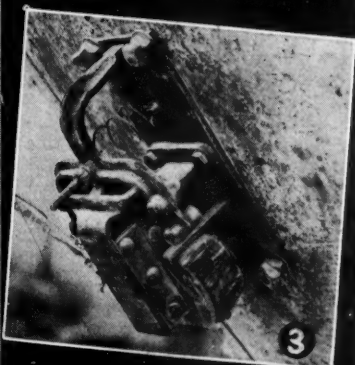
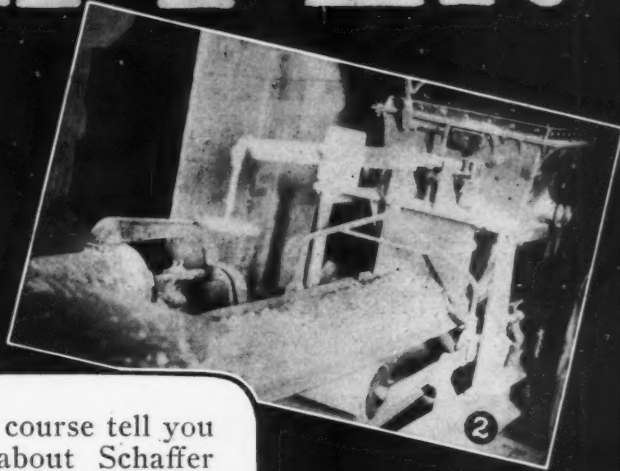
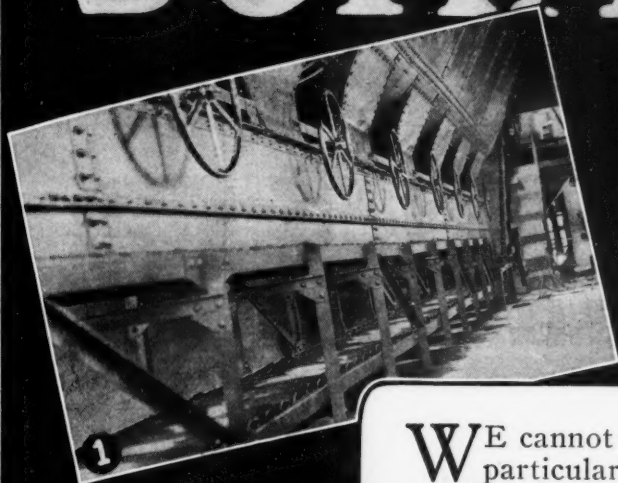
For example, the Schaffer Lime Hydrator; the most efficient hydrator manufactured. Works automatically. Lime delivered to it by weight; water likewise. Result—exact proportions.

1. Installation of Schaffer Automatic Reclaiming System which features large quick-lime storage bunkers.
2. Battery of Schaffer Poldometers compounding lime in a plant manufacturing artificial magnesia by Schaffer process.
3. Installation of Schaffer Hydrator directly connected to finishing mills, where lime is scientifically hydrated and separated in a unit operation.
4. Battery of Schaffer Poldometers compounding different materials and automatically in a plant where high degree of accuracy is necessary.
5. Schaffer Hydrating Plant where concrete is used instead of steel in the construction of bunkers and building.
6. Installation of Schaffer System for cleaning and storing quick-lime.
7. Schaffer Poldometers under construction in shops.





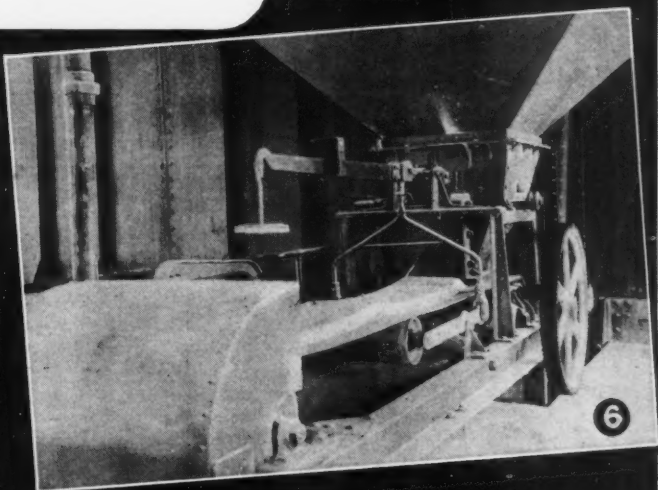
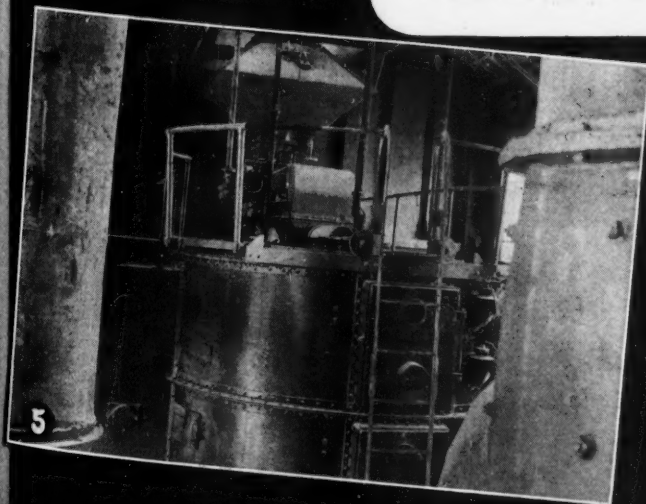
# SCHAFER



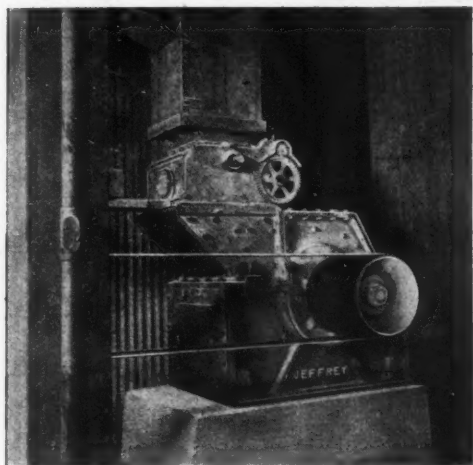
**W**E cannot of course tell you particulars about Schaffer products here. We want to tell you all about the Schaffer Hydrator—the Schaffer Poidometer—and all about our other labor saving products. Write—get acquainted.

**Schaffer Enigneering & Equipment Co.**  
Tiffin, Ohio

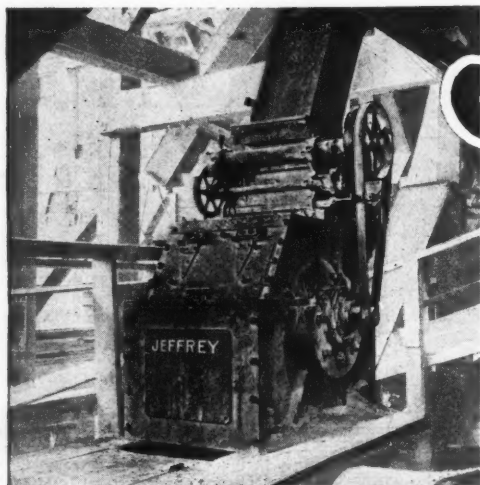
1. Schaffer System for cleaning, reclaiming, screening and loading lump lime into cars. Method used in remodeling old plants.
2. Schaffer Poidometer working under adverse conditions—continually covered with dust and dirt. Machine has been in operation for over a year and is maintaining an accuracy over 99½%.
3. Installation of Schaffer Vibrator for preventing "bridging" of material in large storage bins.
4. Schaffer Drying Plant for drying and preparing raw stone for fertilizer.
5. Schaffer Automatic Regulating Hopper, Poidometer and Hydrator. Hopper controls elevator delivering material; Poidometer weighs lime and water; Hydrator is automatic and produces highest grade of lime.
6. Schaffer Poidometer weighing out powdered material and adding water with an accuracy of 99.80%.



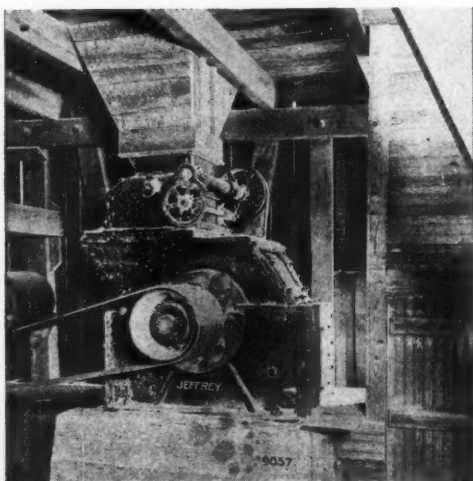




Type "D" Pulverizer in operation at the Ohio State Quarry, Franklin County, Ohio. The bearings of this machine have been in operation for 5 years, with a minimum of attention and with practically no wear



Two Jeffrey Type "D" Ball Bearing Pulverizers are installed at the Agricultural Limestone Plant of the Marble Cliff Quarries Co., Columbus, Ohio



Type "D" Pulverizer at the plant of the Clinchfield Lime Co., North Carolina

# Jeffrey

## Type "D" Ball Bearing Pulverizers

*Are Especially Adapted  
for Making Agricultural  
Limestone*

Selected by the leading quarry operators for increasing their plant capacities to meet the constantly increasing demand for ground limestone.

Write for Pulverizer Catalog No.  
147-D, giving full particulars

**The Jeffrey Mfg. Co.**  
935 North Fourth Street  
Columbus, Ohio

*Manufacturers of Pulverizing, Conveying  
and Elevating Machinery, Chains; Self-  
Propelling Loaders; Electric Trolley and  
Storage Battery Locomotives, etc.*

***Handle it Mechanically***

*You will get entire satisfaction if you mention ROCK PRODUCTS*

# BROWNING

## THE ALL-AROUND CHAMPION

**A** WONDERFULLY varied usefulness has earned for the Browning Locomotive Crane the title of "All-Around Champion."

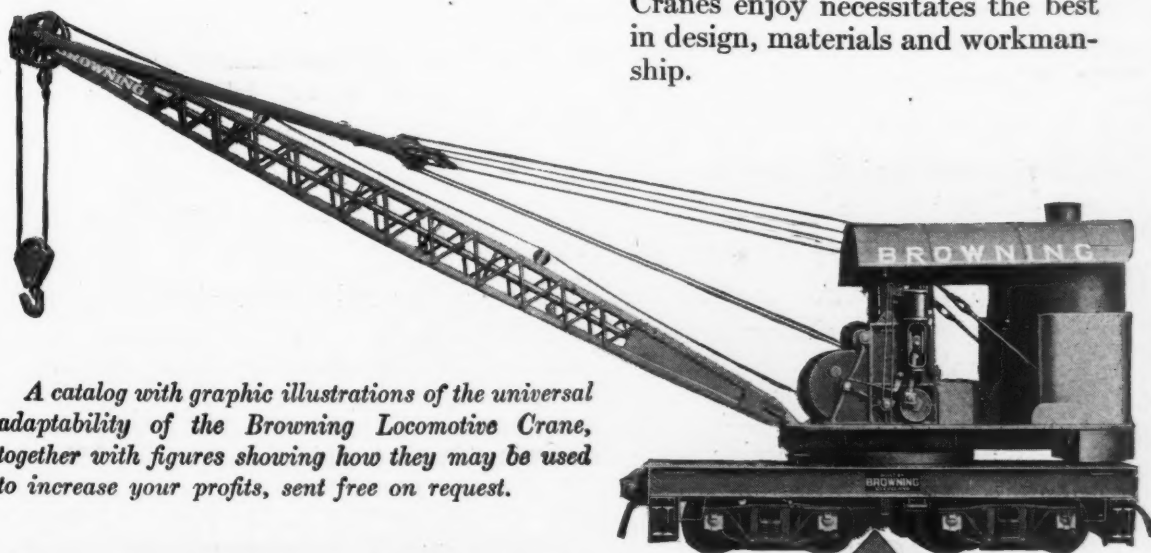
The engineers who have developed it are practical crane men. They have not only made it quick and easy to operate, but with this wide range, have given Browning owners the opportunity to get the largest possible profit.

Every user from the owner of an industrial plant to the general contractor can find a multitude of profitable uses for a "Browning" Crane. It can be equipped to handle a hook-block or grapple, an electric magnet,

any type of bucket, or a drag-line scraper. With a set of pile-driver leads it becomes a pile-driver of exceptional efficiency, or with a Browning Steam Shovel attachment you get a steam shovel of extreme reach and high dump. All are interchangeable.

When you consider all these advantages, and then consider that they will switch their own cars, is it any wonder that the "Browning" is a favorite with all who have been fortunate enough to obtain one?

It is needless to go into the details of the mechanical construction. The wearing qualities of the "Browning" are too well known to need detailed argument. The reputation which Browning Cranes enjoy necessitates the best in design, materials and workmanship.

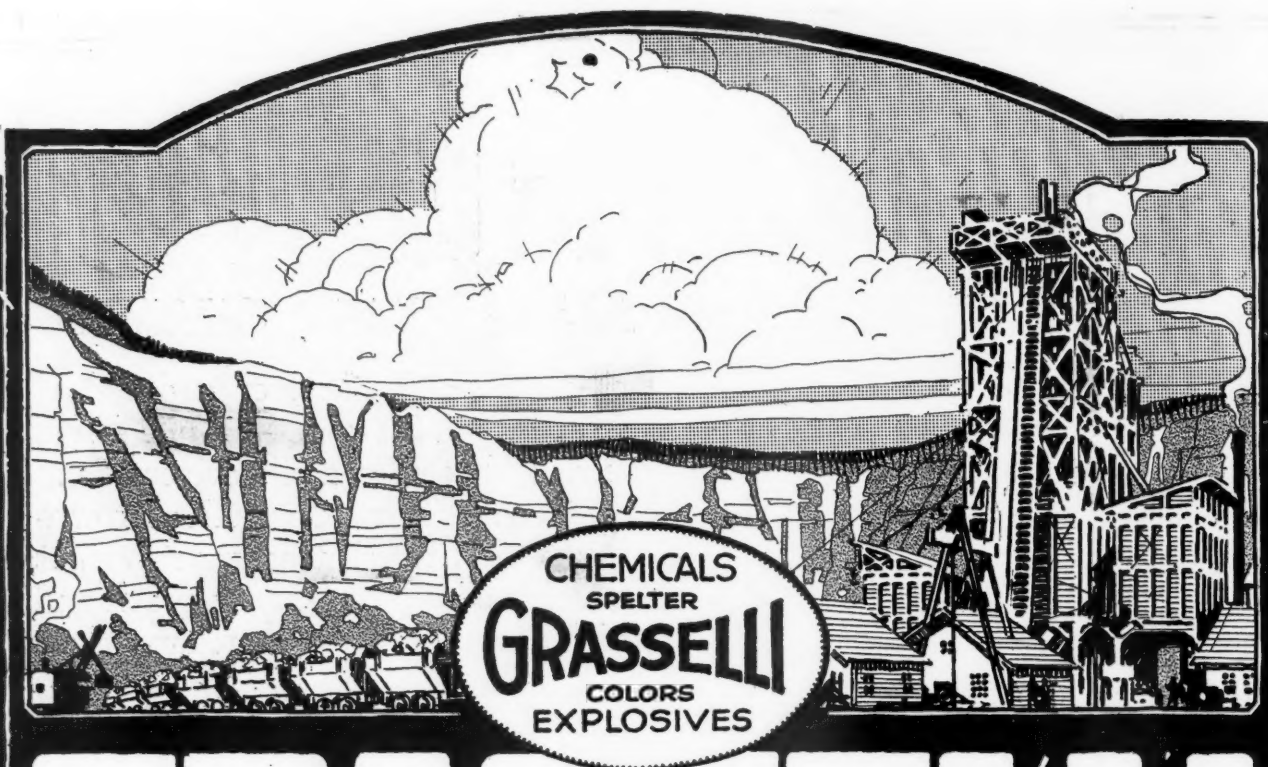


*A catalog with graphic illustrations of the universal adaptability of the Browning Locomotive Crane, together with figures showing how they may be used to increase your profits, sent free on request.*

**THE BROWNING COMPANY**  
CLEVELAND, OHIO

Sales Offices: New York Chicago

Balanced  
for  
Service



# GRASSELLI

## EXPLOSIVES

The period of reconstruction is at hand. Increased production with decreased operating expenses confronts the stone industry with dominating importance.

"Grasselli" powder has demonstrated its value to the stone industry in the past and during the world war. Let it continue to assist you now when increased production for peace time reconstruction is imperative to the continued success of the industry.

The Grasselli Powder Company offers a product and a personal service, together with sincere cooperation, which are of great value in this era of upbuilding.

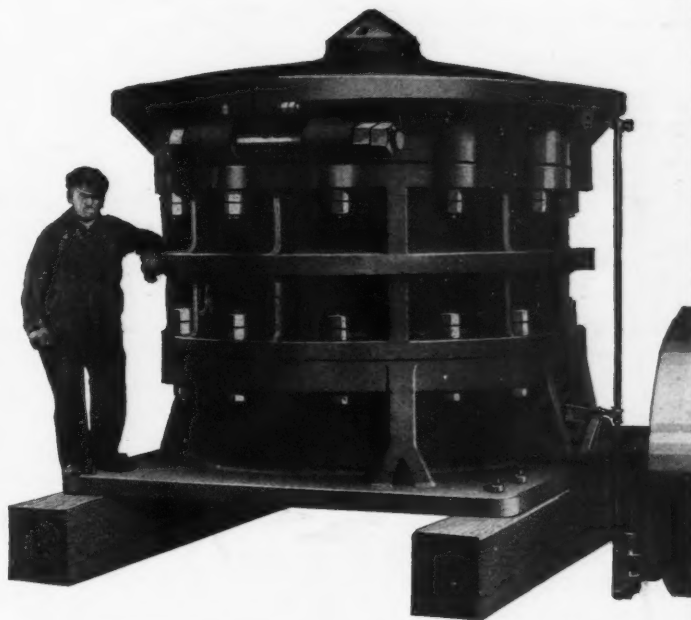
A request for further information regarding "Grasselli" explosives and service will receive prompt and courteous attention.

**The Grasselli Powder Company**  
Cleveland, Ohio



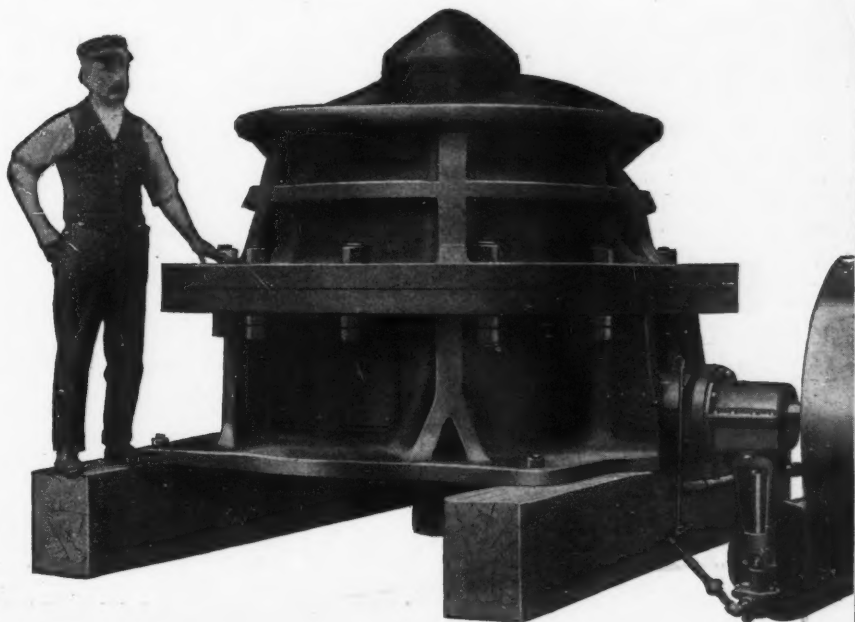
## TELSMITH ALLIES

250-350 cu. yds. per hour  
from steam shovel feed  
down to  $\frac{3}{4}$ -in. -  $1\frac{1}{2}$ -in.  
sizes with only three  
crushers.



The No. 9 TelSmith Primary Breaker (upper picture) takes steam shovel feed, crushing 250-350 cu. yds. hourly. Its feed openings are enormous, each 21 in. by 90 in. It has six distinctive features which are not found in any other breaker. They are:—(1) short, stocky frame; (2) rigid shaft; (3) big crushing bowl; (4) enormous eccentric bearings; (5) automatic oiling system; (6) parallel head movement, with the full stroke exerted on the big lumps as they enter the bowl. This machine produces crushed rock at a lower cost per ton than any other device known to the trade. Glad to send you catalog No. 166.

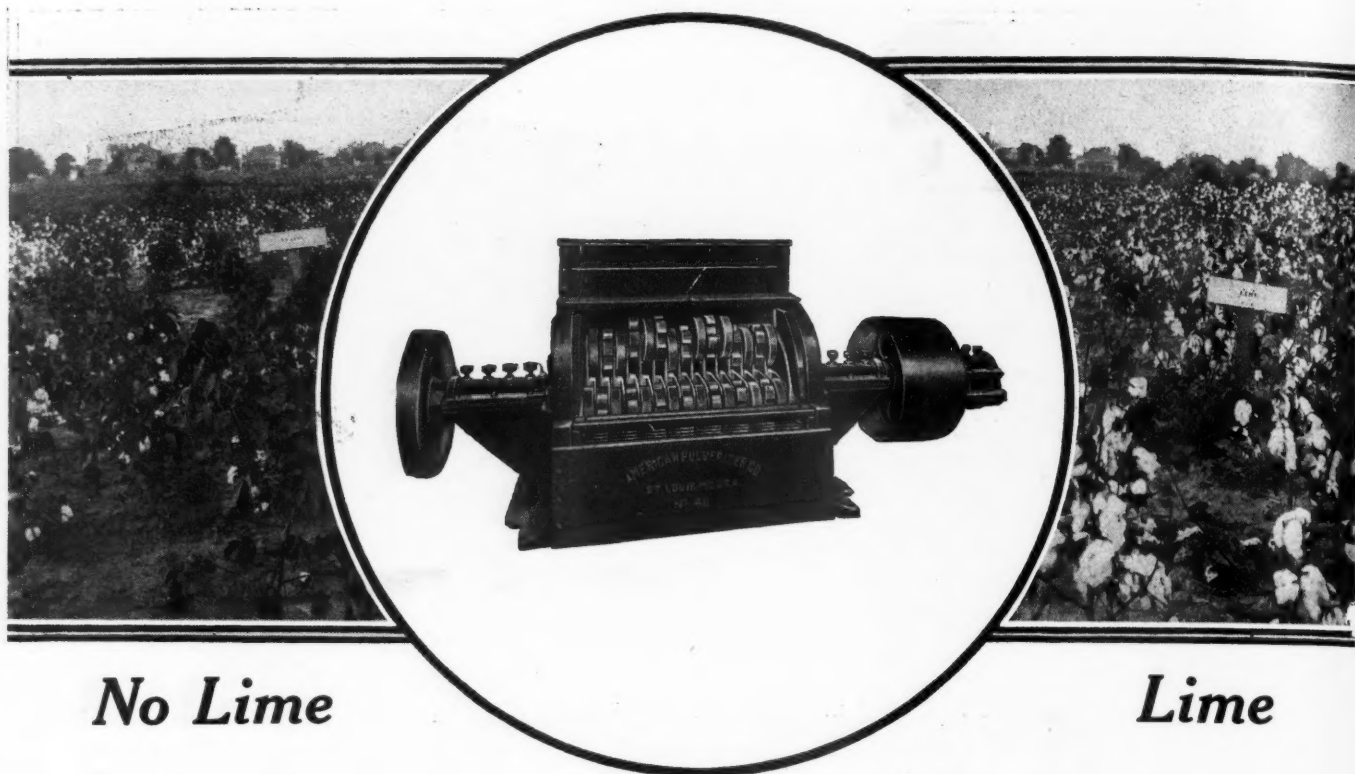
The No. 4 TelSmith Reduction Crusher (lower picture) follows the No. 9 breaker, re-crushing to  $\frac{3}{4}$  in., 1 in., or  $1\frac{1}{2}$  in. One machine will crush 60 to 75 cu. yds. per hour to 1 in. size. Two machines, with grizzlies to by-pass fines, will re-crush all the material that the No. 9 will produce. The No. 4 Reduction Crusher is a simple, massive machine of pillar-shaft design. The enormous open feed hopper will take No. 9 crusher-run by gravity without an automatic feeder. It cannot be choked; takes very little head-room; requires only 50 hp. Tramp iron will seldom damage it. Put this crusher beneath a storage bin and let the ore run into it. Keep the oil tank clean and full. TelSmith will do the rest. Write for bulletin No. 4F11.



### SMITH ENGINEERING WORKS, 3188 LOCUST ST. MILWAUKEE, WIS., U. S. A.

30 Church St., New York City.  
545 Old Colony Bldg., Chicago, Ill.  
325 W. Main St., Louisville, Ky.  
Franklin & Channing Aves., St. Louis, Mo.  
523 Boston Bldg., Denver, Colo.  
710 Witherspoon Bldg., Philadelphia, Pa.  
Garfield Bldg., Cleveland, Ohio.  
930 Oliver Bldg., Boston, Mass.  
110 W. Park Way, N. S., Pittsburgh, Pa.  
Brunson Bldg. Columbus, Ohio.

*It gets immediate attention if you mention ROCK PRODUCTS.*



## It Benefits All Crops in All Parts of the Country

**PULVERIZED** Lime will now be in greater demand than ever before. More farming will be done, due to the return to normal of man power.

## American RING Pulverizer

is the machine to best produce agricultural lime. If you have one installed you know this to be true.

You get speed and a fine product at a lower operating cost than other mills producing a coarser material.

The American Ring Pulverizer is guaranteed to accomplish certain results before it is installed. Write us the details about your plant and we will tell you exactly what an American Ring Pulverizer will do for you.

☐ **Start the Ball Rolling—Write!**

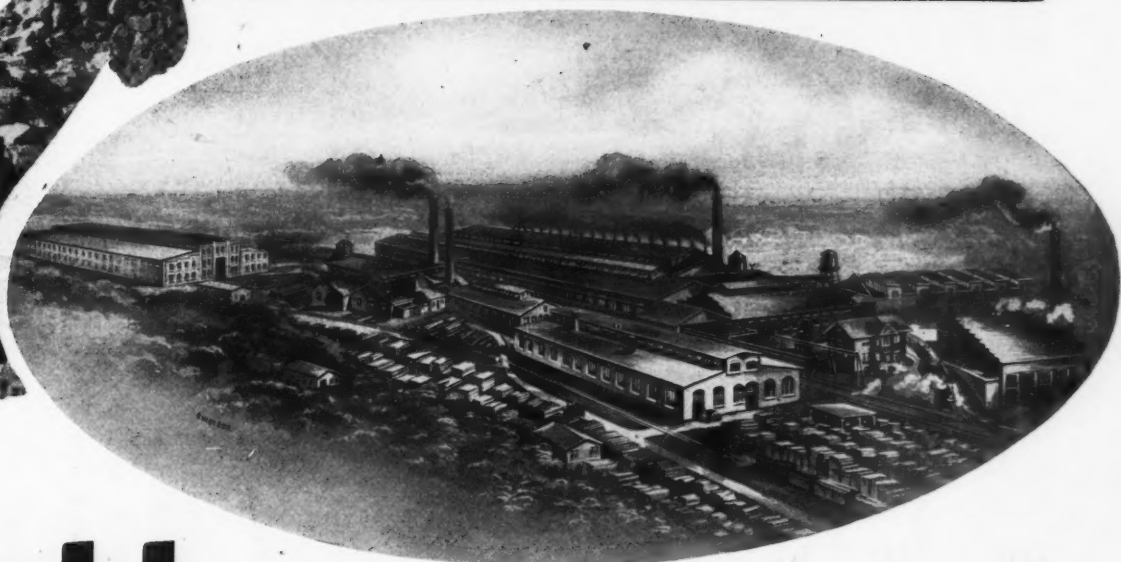
**AMERICAN PULVERIZER CO.**  
Cor. 18th and Austin Sts. ST. LOUIS, MO.

**You Can Sell  
Pulverized  
Limestone  
for  
Fertilizer**

Saying, "I saw it in **ROCK PRODUCTS**," will bring quick action.



# The Largest Car Builders in the World



# Watt Cars

**D**O YOU realize what this means? To buy cars from the largest builders in the world is to buy from an organization with the most highly perfected organization—from an institution that can buy at rock bottom prices and consequently give you most for your money.

Watt Cars have made our plant the largest by their consistently satisfactory work. And we have made Watt Cars satisfactory by building cars to measure only.

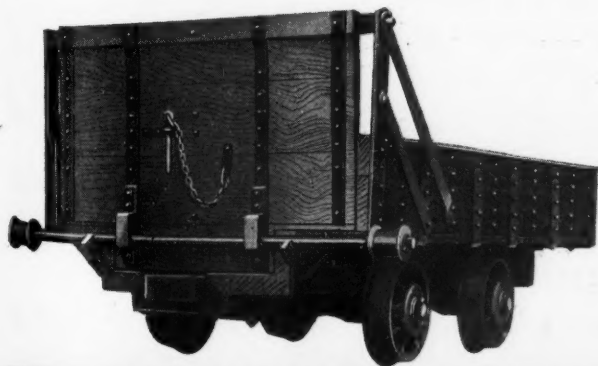
In planning for a plant, we consider the proposition carefully and build Watt Cars to exactly meet requirements. That's why Watt Cars cannot help but make good.

**Let Us Explain!**

**Watt Mining Car Wheel Co.**  
**Barnesville, Ohio**

Denver: Lindrooth, Shubart & Co.,  
Boston Bldg.

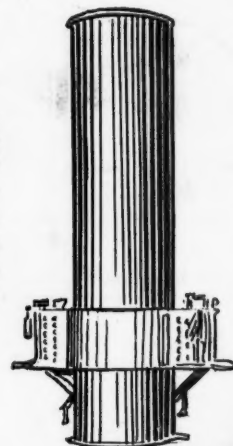
San Francisco: N. D. Phelps,  
Sheldon Bldg.





# Let Us Put This Booklet on Your Desk

235 now in use.  
And Keystone  
Kilns are used all  
over the world un-  
der all conditions.  
But, wherever they  
are, Keystones in-  
variably make  
good.




## Keystone Kilns

—all about them—how Keystones are built by experienced engineers who have had actual experience in lime burning — the exclusive advantages of Keystones — pictures of Keystone installations—and other interesting data—in our booklet.

Get It!

**Steacy-Schmidt Mfg. Co.**  
York, Penna.

*For better service say, "I saw it in ROCK PRODUCTS."*



**Austin**

AUSTIN MFG. CO.  
CHICAGO, U.S.A.  
No. 10

- Gyratory Rock Crushers
- Motor Tandem Rollers
- Motor Macadam Rollers
- Portable Stone Bins
- Stone Elevators
- Stone Screens
- Elevating Graders
- Road Scarifiers
- Street Sprinklers
- Street Sweepers
- Dump Wagons
- Stone Spreaders
- Horse Drawn Rollers

## AUSTIN

### Gyratory Rock Crushers

Reconstruction abroad means more construction at home.

More than ever before, American contractors, builders and quarry-operators are in need of rock-crushing and rock-handling equipment that can be depended upon to deliver larger outputs and that will work steadily and efficiently without interruptions and breakdowns.

**Austin Gyratory Crushers**—ranging in capacity from 50 to 5,000 tons per day—are guaranteed to render continuous service under the most severe operating conditions. Their convenient adjustment means an easy, speedy change in the side of the product; their large output cuts down tonnage costs because they work steadily over a wide range of material.

Write today for catalog, describing and illustrating **Austin** Crushers, Elevators, Hoists, Cars, Screens, Bins, Stone Spreading Wagons and all types of Road Building and Maintenance Equipment.

Our engineering experts will be glad to help you solve your problems and advise you as to the machinery best suited to your needs.

During the War the United States and Allied Governments purchased  
**Over 700 Austin Motor Rollers**  
More than ten times their combined  
purchases of all other rollers.  
And at Higher Prices. **WHY?**

**Austin Manufacturing Co.**  
**CHICAGO**

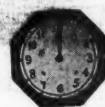
New York

San Francisco

*The advertiser wants to know that you saw his ad in ROCK PRODUCTS.*

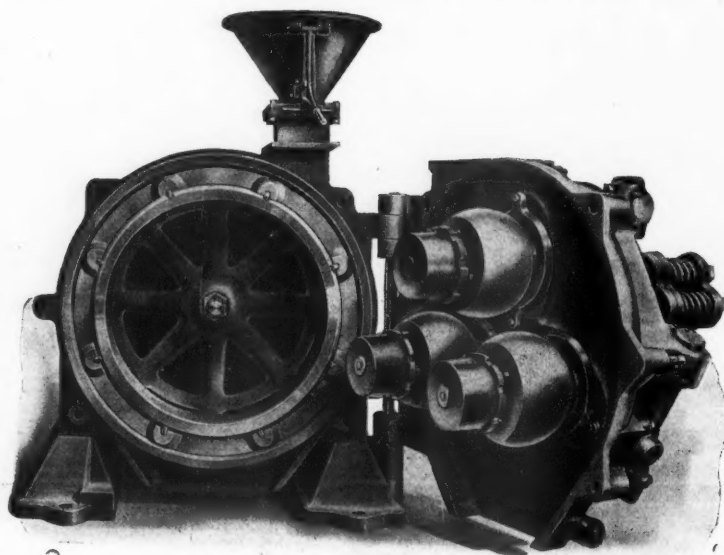


"ONE MAN - ONE MINUTE"



# STURTEVANT "OPEN-DOOR" MACHINERY

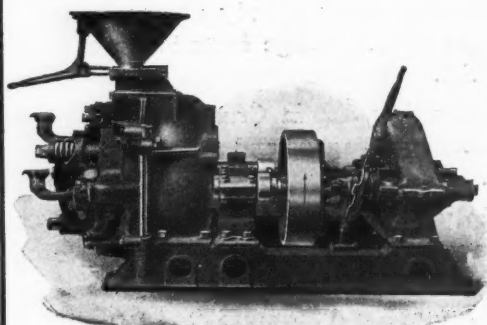
## "Open-Door" Sturtevant Ring-Roll Mills



Patented

Release the bolts, throw open the door and every wearing part is within easy reach. One man can open a five ton door in a very few minutes.

Is this not a time and labor saver? Can anyone afford a machine that takes hours and sometimes days to get into? They are slow speed durable machines crushing by spring pressure and not by centrifugal force.



Patented

Ring-Roll Mills are used for pulverizing hard or soft substances from 1½ inch to 80 mesh or coarser. For Cement Clinker, Limestone, Phosphate, Trap, Granite, Feldspar, Fire Clay, Shale, etc., etc. Built in 5 sizes—capacities 1 to 25 tons per hour.

SEND FOR CIRCULAR

**STURTEVANT MILL CO., BOSTON MASS.**  
HARRISON SQUARE

*You will get entire satisfaction if you mention ROCK PRODUCTS*





"ONE MAN - ONE MINUTE"



# STURTEVANT "OPEN-DOOR" MACHINERY

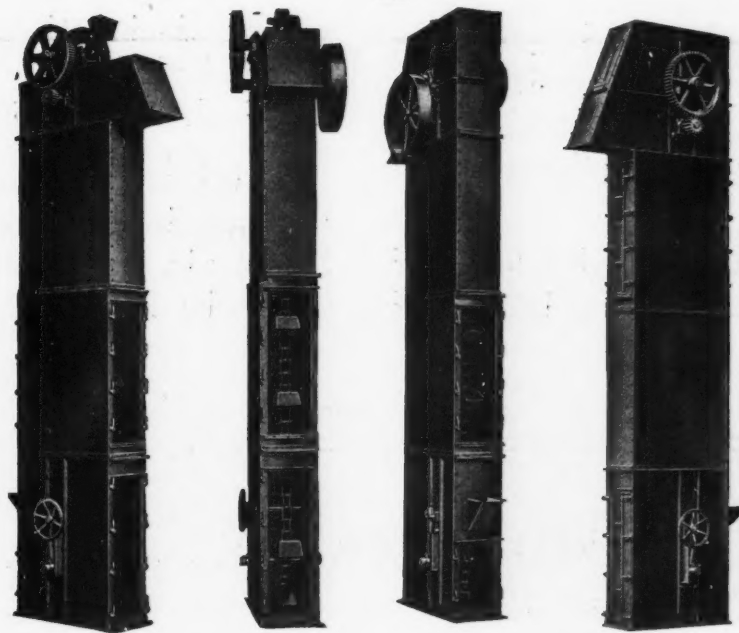
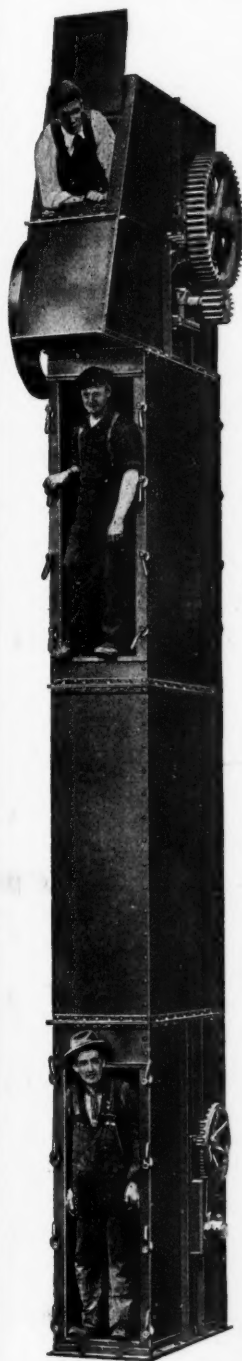
## "Open-Door" Sturtevant Steel Elevators

All Steel, accessible construction, so that **one man in one minute**, can open any door, without the use of tools and immediately get at all important parts.

Self contained, everything complete, ready to set up when received. Big accessible discharge, with adjustable spill board. Split head, heavy gears, and pinions, ample shafts, ball and socket bearings. Automatic Take-Ups for quick, accurate, fool proof adjustment, self aligning bearings.

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## *Inventory reducing price announced on Leviathan-Anaconda, the standard belting for stone elevating and conveying*

**O**WING to the reduction of stocks incident to placing Leviathan-Anaconda on a peace basis, it is possible for today to purchase these belts at a price about equivalent to that of ordinary belts. Usually Leviathan-Anaconda prices are about 75% above these belts.

This price is about 25% under standard grades of rubber belting, whereas ordinarily Leviathan-Anaconda brings 10% in excess of rubber prices.

These prices are temporary and are solely to reduce the excessive war inventory of Leviathan-Anaconda stocks.

Leviathan - Anaconda are the standard belts of the stone industry. Under ordinary circumstances you pay higher for them at the start but they cost you less.

We can tell you why 90% of stone conveyors give out instead of wear out.

We can show you why a belt built as Leviathan is built carries its load at the lowest cost per ton.

We can give scientific reasons for the records of Leviathan—five seasons' elevator work in the most active stone plants in the country.

One example is the Ohio Ballast Co. of Cincinnati—handling a million and a half tons of material over a 30 inch 8 ply Leviathan.

This is an opportunity which will be recognized by every live superintendent in the industry. Write for particulars.



### **MAIN BELTING COMPANY, PHILADELPHIA**

**NEW YORK BOSTON CHICAGO PITTSBURGH ATLANTA SAN FRANCISCO**

Birmingham, England Paris, France Bulle, Switzerland Kristiana, Norway  
Johannesburg, South Africa Petrograd, Russia Havana, Cuba

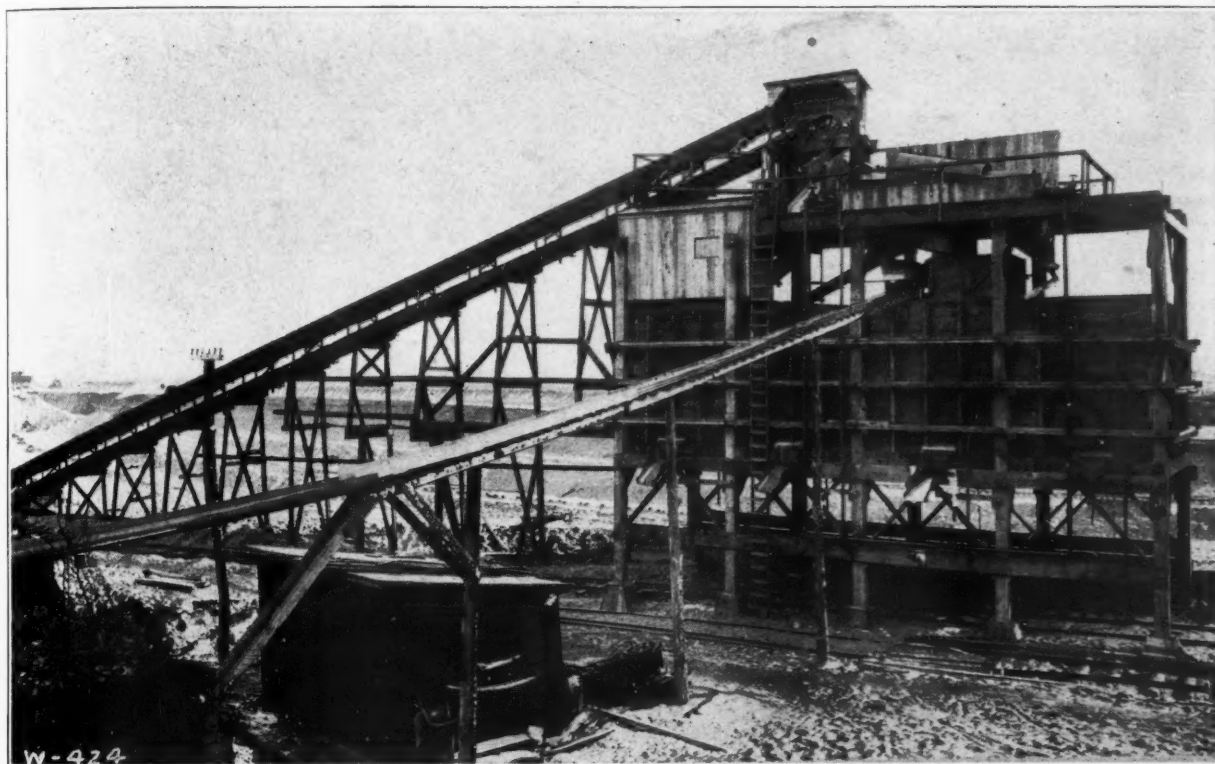
MAIN BELTING CO. OF CANADA, LTD., Montreal, Toronto



*To say you saw the ad in ROCK PRODUCTS gives tone to your inquiry*

# WEBSTER Sand and Gravel Plant Machinery

also Conveying and Elevating Equipment for all large operations



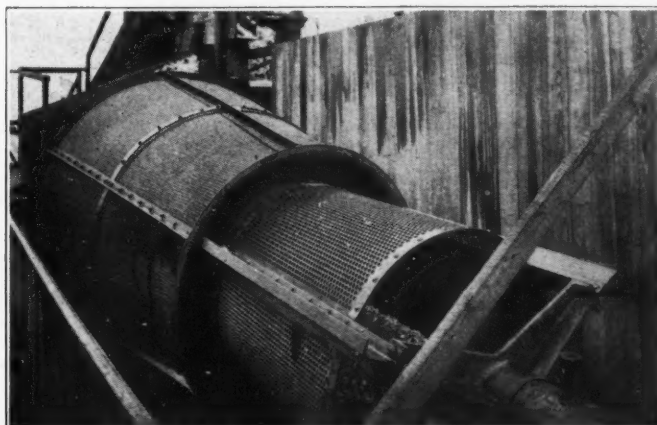
When you buy Webster Machinery you get two vital things:

1—The benefit of an engineering staff that is particularly skilled in planning economical and productive plants.

2—Dependable machinery. Webster Machinery cuts costs, saves labor and increases production.

Explain your requirements and receive the benefit of the experience of an organization that has successfully served big operators for over 40 years.

The large illustration shows a Webster Cyl-Cone Sand and Gravel Washing Plant at Ludlow, Ky., owned by Ideal Supplies Company.



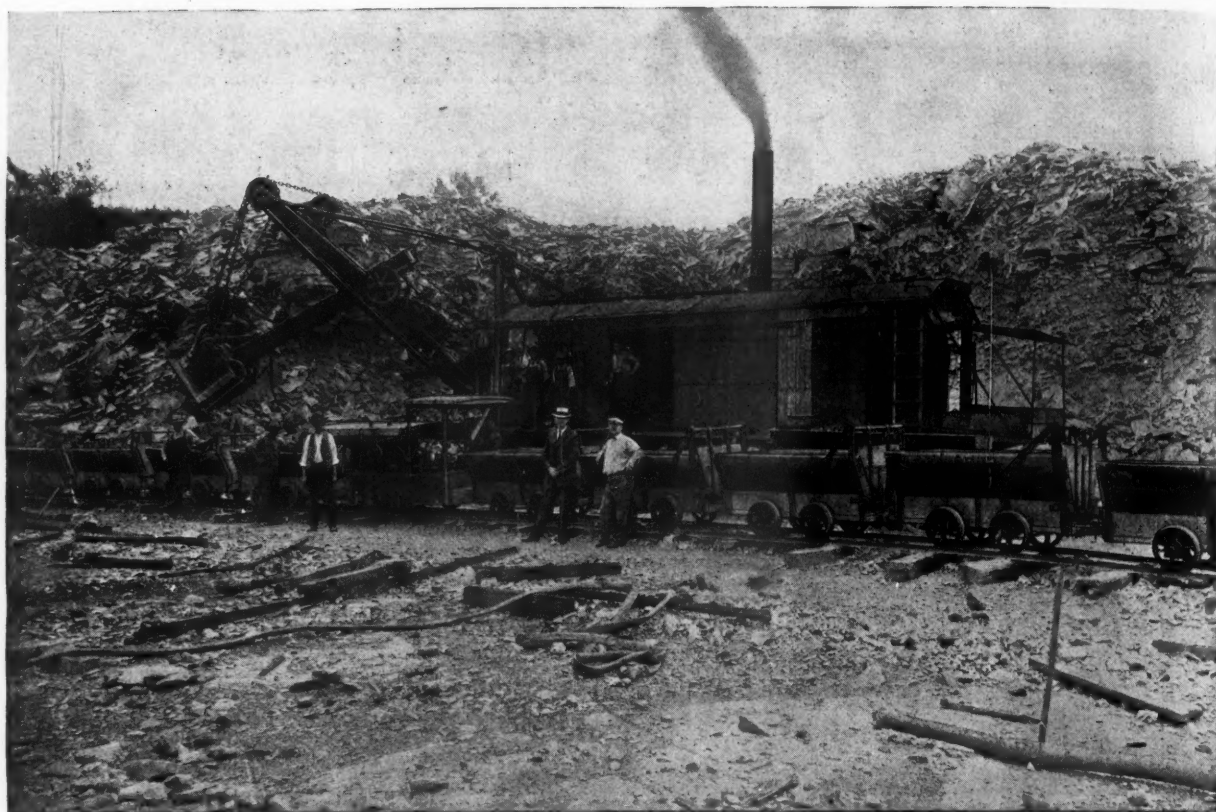
The Webster Cyl-Cone Screen, shown at left, permits a particularly economical arrangement and construction for a plant to make three or more size separations.

(270)

**THE WEBSTER M'F'G CO., TIFFIN, OHIO, U. S. A.**  
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# PLYMOUTH

## *Gasoline Locomotives*

### Volume—Speed—Profits

Work doesn't often pile up for The Brokensword Stone Co., Bucyrus, Ohio—its steam shovel, its two "Plymouth" Gasoline Locomotives and its long trains of cars keep things hustling right ahead, hour after hour.

At this plant, one "Plymouth" handles 500 to 700 tons a day. The haul is 2,000 feet long—much of the track is rough, with sharp curves, but the Locomotive uses only about 7 gallons of gasoline daily. Officials declare "Plymouths" the best on the market.

Efficient locomotive equipment will help *you* get out more material—hold production steady; keep overhead costs down; increase plant profits.

Scores of "Plymouths" are doing splendid work for stone and cement companies; dozens more in sand and gravel plants. Write, describing your haulage conditions fully and we will send you an interesting book describing and picturing "Plymouth" service in many big plants.

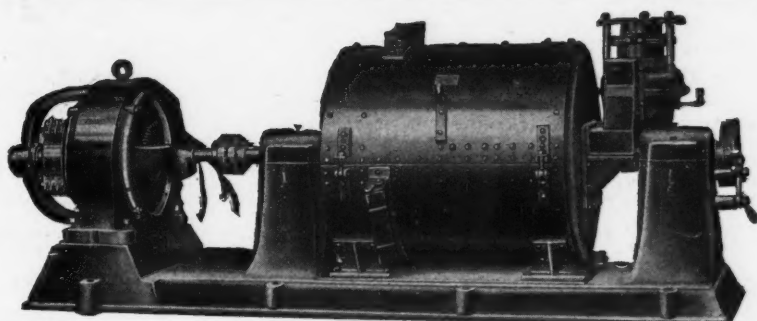
THE J. D. FATE COMPANY, 210 Riggs Avenue, PLYMOUTH, OHIO

New York Philadelphia Norfolk Pittsburgh Cleveland Detroit Kansas City Minneapolis Portland

*Saying, "I saw it in ROCK PRODUCTS," will bring quick action.*

# Pulverized Fuel Combustion

*A Complete  
Powdered  
Coal Plant*



*In  
One  
Machine*

## THE AERO PULVERIZER

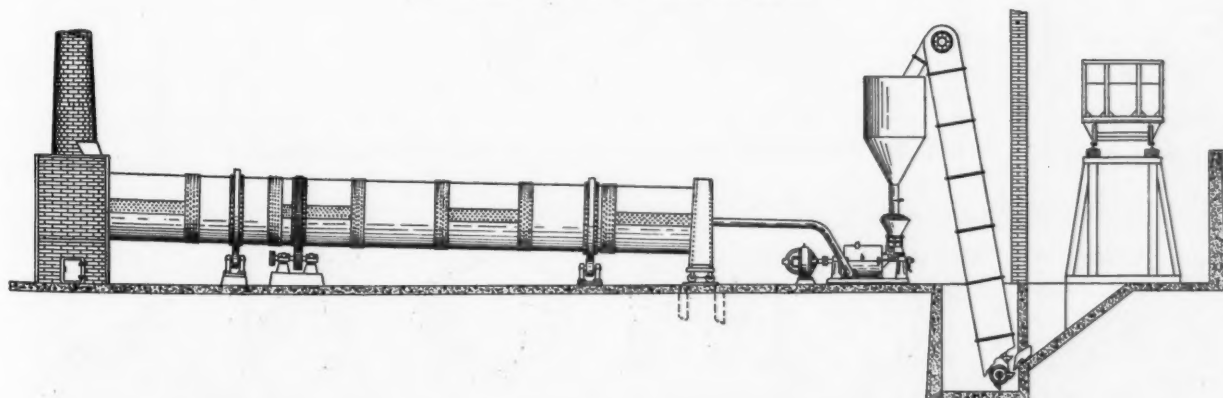
is standard equipment for firing rotary kilns for calcining Cement, Lime, Gypsum, Magnesite, Dolomite and all dryers.

Makes available the highest coal efficiency. Temperature regulable at the will of the operator.

The pulverizing of the coal, mixing of the minute particles of coal with the correct amount of air for complete combustion and the projecting of this mixture into the kiln or furnace, are all completed in one machine.

Note the installation below, which shows the simplicity of the Aero equipment between the siding and the stack.

Write for our literature.



### The Aero Pulverizer Co.

Room No. 1441

120 Broadway

New York

*Cooperation is the thing—please mention ROCK PRODUCTS*

## The Demand of the Times: RESULTS! PROVEN EFFICIENCY!

Because a vast amount of construction work held up for years by the Big War has suddenly been released upon the engineering and contracting field, the imperative necessity is for thorough efficiency and thorough reliability in all equipment—for A No. 1, twenty-four-hour-a-day Results!

### The Symons Disc Crusher Stands Upon a Long-Established Record of Achievement

Road work, new and repair, in every state in the Union, will create a far-reaching demand for such equipment. Railway, public and private building and construction, and new projects running into millions of dollars, will be let out. The volume of this work requires concentrated efficiency, to meet and handle it successfully.

The Symons Disc Crusher is not only highly successful in its own field—which was originally secondary crushing—but it is also doing excellent work as an initial breaker for hard-heads and gravel.

The Symons makes play of its work. It should have a place in every modern plant. Remember—its upkeep is scarcely "in sight," and its dependability is supreme.

*Write for full illustrated literature*

### Chalmers & Williams

1425 Arnold Street

Chicago Heights, Ill.

#### Record of a 48-inch Crusher in the field

Material crushed,  
Limestone.

Length of time operated,  
3 years.

Size of feed, 4".

Size of product, 1½".

Horsepower used, 65.

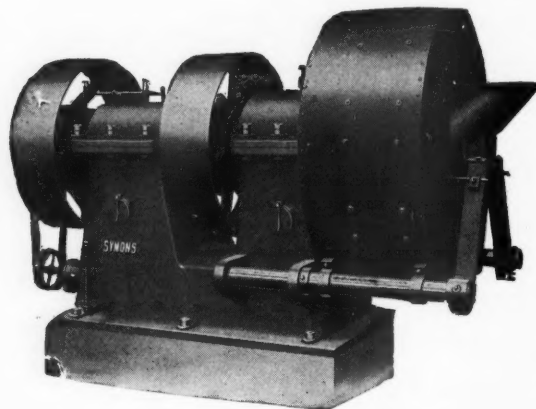
Tons per hour, 80 to  
100.

Tons crushed per set  
of discs, 750,000.

A 6" feed can be  
handled just as  
effectively.

No lost time on account  
of breakage.

We also build them  
in 18" and 36" size.



#### Record of a 24-inch Crusher in the field

Material crushed,  
Gravel and Hard  
Heads.

Length of time operated,  
2 years.

Size of feed, 2".

Size of product, ¾".

Horsepower used, 20.

Tons crushed per  
hour, 25.

Original crushing  
discs still in use.

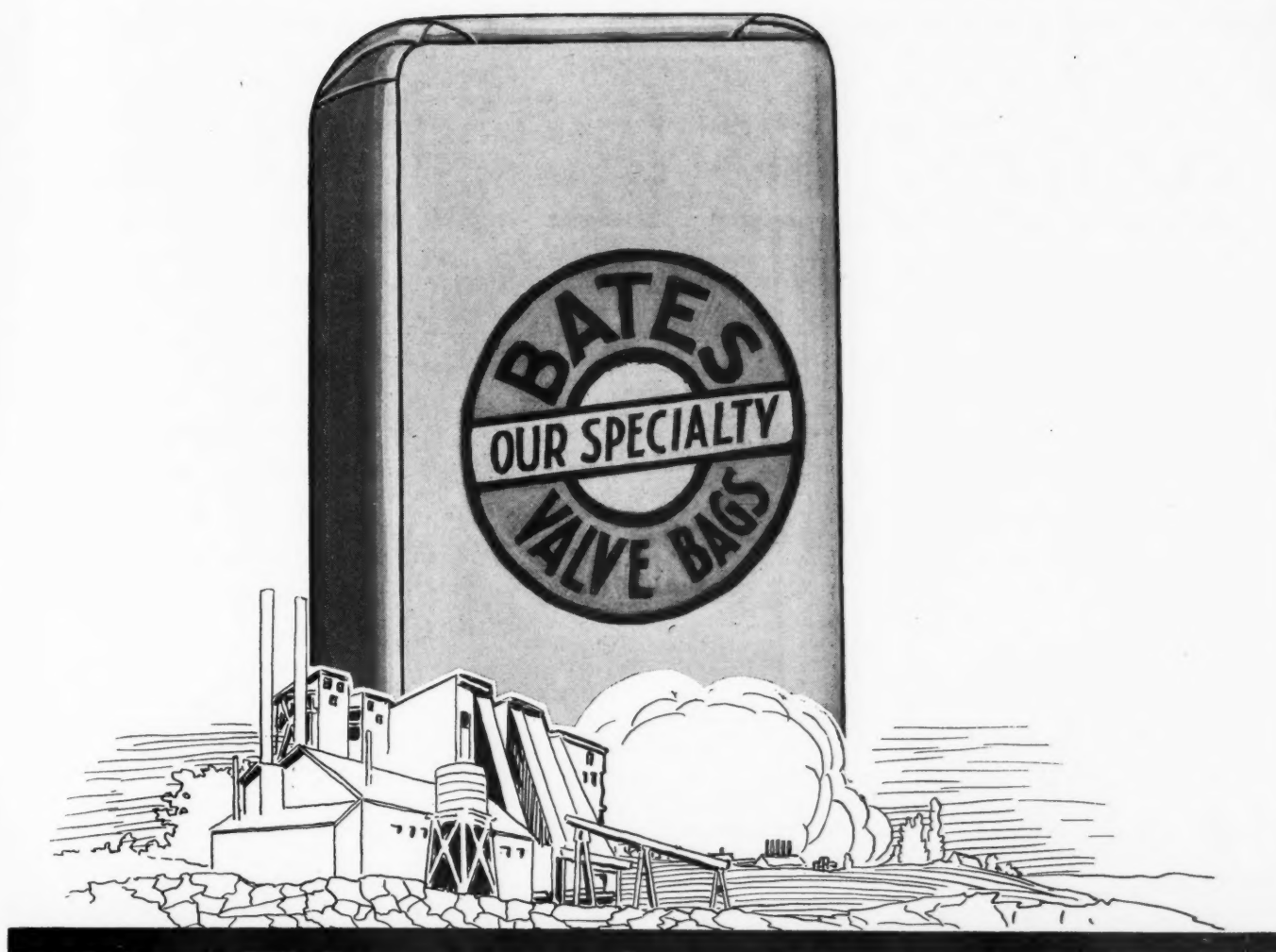
No lost time account  
breakage.

Superior to Rolls,  
Jaw or Gyratory  
Crushers on this  
class of work.

# SYMONS DISC CRUSHER

*For better service say, "I saw it in ROCK PRODUCTS."*





## A Giant of the Industry

Ninety-five per cent of the hydrated lime producers in America use Bates Bagging Machines.

Bates Baggers offer the proper solution to the question of economically bagging agricultural lime for shipment.

Bates Bags are self-sealing. They can't sift or leak. Shortages are impossible. And stacking them is an easy, swift process.

Bates System is unexcelled for bagging your lime products. It makes shipment of agricultural limestone an easy, economical matter.

Ask for Particulars

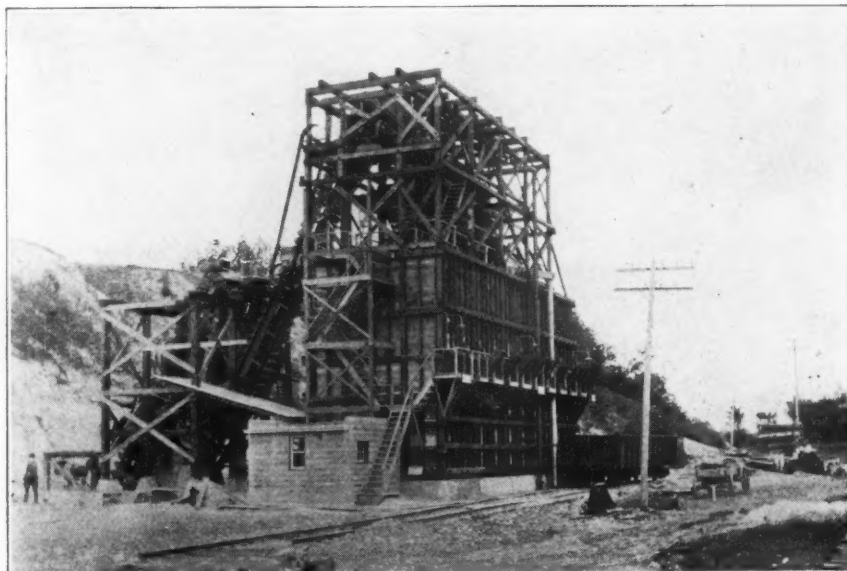
### Urschel-Bates Valve Bag Co.

Main Office and Factory: Toledo, Ohio

Branch Plant: Windsor, Ont.

# As Surely as the Sun Shines

There will shortly be an almost unlimited demand for road building materials. Do you have the equipment to take care of this demand? If not, it will pay you to confer with us.



A Complete Sand and Gravel Plant Installed for the Elkhart Sand and Gravel Co., Elkhart Lake, Wis. Capacity, 1,600 Tons Per Day of 10 Hours

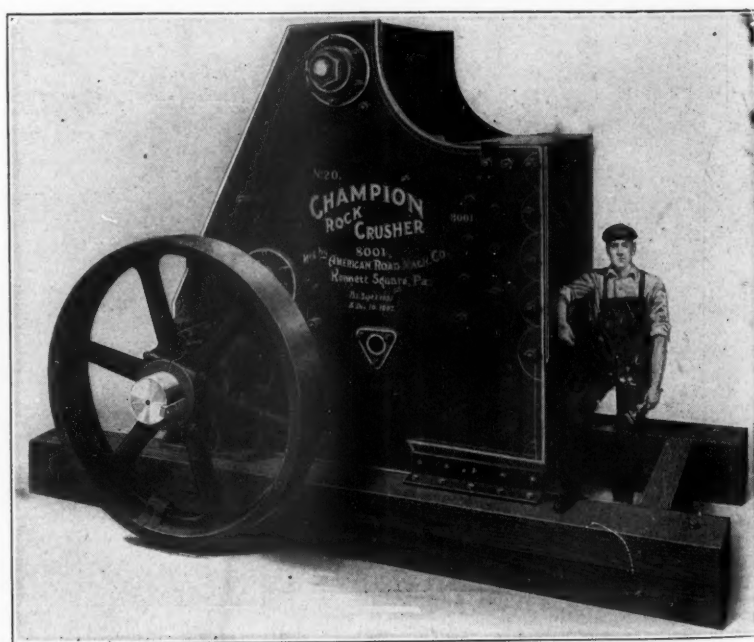
We design, build and install complete Rock Crushing Plants of any desired capacity.

This view shows our No. 20 (22 by 50) Champion Steel Rock Crusher. Steel construction, large jaw opening, replaceable bushings, and low feeding mouth are a few of the features that serve to make this an extremely popular machine with quarrymen everywhere.

Elevators, Screens and Conveyors for every purpose.

Write for Catalogue F. A. Y. It is free and will be furnished without obligation.

ADDRESS



No. 20 Champion Steel Rock Crusher. The Ton a Minute Machine

**The Good Roads Machinery Co., Inc.**  
Fort Wayne, Indiana

*You will get entire satisfaction if you mention ROCK PRODUCTS.*

We design, build and install Complete Plants for screening and washing sand and gravel.

Our plants embody every modern feature of advantage and many labor saving devices unknown to other equipment of this kind.

Ask for Our Catalogue No. 5

It is complete and will interest you

# Rock Products

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March 29, 1919

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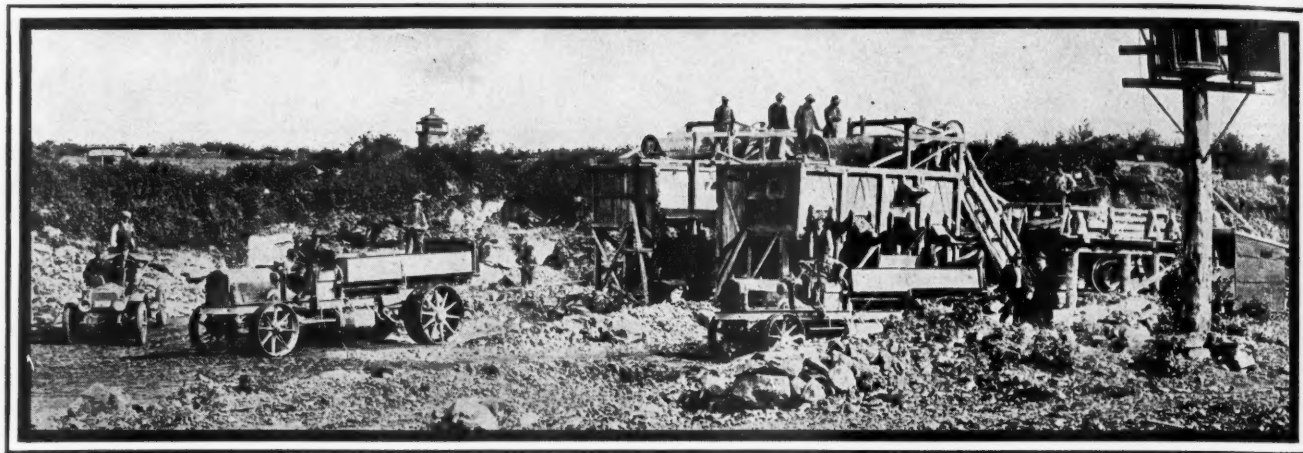
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# White Trucks



## TWENTY WHITE TRUCKS BUILD 100 MILES OF ROAD

**W**ITHIN a period of 12 months, a fleet of ten 5-ton and ten  $\frac{3}{4}$ -ton White Trucks has completed more than 100 miles of gravel road in the Province of New Brunswick.

The trucks carried the materials from the gravel pits and quarries direct to the job, the average haul of the fleet being 650 tons daily. Each of the smaller trucks averaged 12,000 miles travel during the 12 months; the larger trucks 5,000 miles.

It is on these unusually hard jobs—where a truck of less durability would break down—that White stamina shows to greatest advantage. In selecting White Trucks, the contractor knows that his hauling will be completed at lowest cost, with absolute certainty, and on time.



**THE WHITE COMPANY**  
CLEVELAND

*It gets immediate attention if you mention ROCK PRODUCTS.*

# Rock Products

Vol. XXII

Chicago, March 29, 1919

No. 7

## The Agricultural Lime Season Is On!

Effective Promotion Will Tremendously Add to Tonnage of Lump Lime, Hydrate and Limestone Consumed in Agriculture

THE THREE FACTORS MOST NECESSARY to increase the already rapidly growing agricultural lime industry are (1) Lowest possible selling price with a reasonable profit; (2) Low freight rates; (3) Improved methods of distribution.

Economies in production methods should be carefully studied to keep the price down to a figure within reach of the immense army of buyers represented by the average and none too wealthy farmer.

The statistics for the 1917 and 1918 seasons proved conclusively that high prices were a very important factor in reducing the use of agricultural lime and limestone.

Farmers have an excellent reputation for paying their bills. The business can be conducted successfully on practically a cash basis. These considerations should be given weight in making up the selling price.

Agricultural lime and limestone can not in general carry a freight rate greater than half the F. O. B. plant price of the commodity. Any increase in present freight rates would be a calamity to both farmer and producer.

It is in the interest of the railways to promote industries, for industry makes commerce, and commerce is transportation. The greatest of all American industries is agriculture, and all authorities agree that the use of lime and limestone promotes agriculture.

The railways have argued that if the farmer makes a large profit from the use of limestone he can afford to pay a higher freight rate on it. By the same reasoning he could afford to pay a higher price for it to the manufacturer.

The fact is, however, that not one farmer in five hundred who ought

to use lime, ever has used it, or ever will, unless encouraged to do so by a price he considers within his means. The profit he can make from its use is intangible until he begins to use the lime. The problem is to get him to begin using it. After he has used it for a while he will not discontinue its use for any moderate increase in price or freight rates. But the time isn't yet ripe for those increases.

A way must be found to make the material more available to the small farmer. In this there is ample evidence that the railways are willing to help. It seems that in numerous instances by cooperation with the farmers they are solving the problem independently of the producers. Let the producers cooperate too.

It doesn't look now as though much land would be tilled or many crops harvested in Europe this year. They are too busy cutting one another's throats. The survivors will have to be fed. The United States has got to do it. We have got to feed ourselves. Never was there greater need of increased food production. Never was there greater need of using agricultural lime and limestone.

Therefore a truly wonderful opportunity is within the grasp of every manufacturer of lime and pulverized limestone. The opportunity is big enough for all. There can be no real competition between such allied products.

The producers of lime and limestone have to a certain extent been too modest. Their products play a much more important part in agriculture than even they have often claimed. As will be explained in subsequent articles by competent authorities, it isn't *only acid soils* that are improved by lime and limestone, it is *any run-down soil*.

### And There Is Lots More to Come!

THIS ISSUE of Rock Products the editor honestly believes contains more constructive suggestions and comments on the agricultural lime and limestone industry than has ever been assembled between two covers; and the editor takes this opportunity to thank the contributors who have made that possible.

Rock Products also takes this occasion to announce that as much again material along the same lines, which was designed for this issue, will be published in the next and following issues.

Comments from producers on the suggestions made by various contributors in this issue are earnestly solicited and it is believed will help the game along.

We know you don't agree with a lot of the things published in these pages, but you ought to read and think about them just the same.



# Government Summary of Sand and Gravel Industry in War Time

Various Varieties and Uses of These Materials Defined and Essentiality Proved

**TO MANY PEOPLE** sand is used most commonly for mortar and plaster in building operations, and gravel for concrete and railroad ballast. Were these their only uses the sand and gravel industry would be large but not widely interesting. Sand and gravel are employed in many other ways, however.

It is well known that sand and gravel are widely distributed, abundant, and much used in the United States, but their vital importance in the economy of the Nation was scarcely appreciated until war made unusual conditions and demands. The demand has been so great in recent months that in some places on the Atlantic coast sand and gravel have almost attained the status of war minerals. At certain shipbuilding and camp sites there is no gravel readily available and sand suitable for building is scarce. Sand dunes may be abundant, but the grains are too small.

So great has been the demand for sand and gravel in large Government construction work that this common and cheap building material has been shipped considerable distances. It is understood that for some of the building recently done near Norfolk, Va., where the supply is inadequate, the sand and gravel were brought from New York, a distance of 300 miles, by sea in coal barges that otherwise would have returned empty; hence the cost of transportation was small.

#### Fourth in Value of Nonmetals

Only four natural nonmetallic minerals produced in the United States—not including clay products and cement (manufactured products)—show a greater annual value than that of sand and gravel; these are petroleum, natural gas, coal, and stone. The production of sand and gravel in 1917 was valued at more than \$35,000,000. This is an undervaluation, for the list of producers is notably incomplete and it has not been possible to get reports from numerous producers who dig small quantities intermittently for local use.

The statistics more nearly represent the actual output of the industry than the reports of previous years, as the list of producers known to the Geological Survey is constantly increasing. It must be admitted, however, that the statistics are incomplete, as there are some States in which almost no producers are known and in all States sand and gravel are

By R. W. Stone  
U. S. Geological Survey

produced for local use in hundreds of villages, of which no information is obtained and the aggregate quantity of which must be large.

Most of the producers fill out reports in correct form, and this is especially true perhaps of the members of the National and State associations, for they keep accurate and detailed records of their business and appreciate the importance and use of these statistical data.

#### War Uses of Sand and Gravel

The utility of sand and gravel has only to be mentioned to be appreciated, but to most people the great variety of their uses is unknown and their connection with war is unrecognized. Of course the largest quantity of sand produced in this country is that used by builders. Although the building operations in the large cities of the country were much less in 1917 than in 1916, in some localities there was an amazing increase in building. Among these large building operations may be mentioned cantonments, shipyards, and towns engaged in the manufacture of munitions and other war necessities. Sand and gravel are used in these structures, from the concrete piles and foundations placed in the ground to the mortar in the chimneys that rise above the gravel roofs. Other war-time uses of sand and gravel are mentioned in the following paragraphs.

**Molding sand** is used for casting molten metal and is of many kinds. There are three main classes—steel, iron, and brass molding sands. Each class includes several varieties of sand, the particular variety used depending on the size and weight of the casting and the position occupied in the mold. It is easily seen how important these sands are in war time, when a nation is making great quantities of machinery and munitions requiring castings in all these metals. Sand is used for molding such diverse things as shrapnel and the bodies of gasoline engines, cannon and car wheels, and for making many other things intimately connected with the prosecution of war.

**Steel-molding sand** is a white or yellowish clean quartz sand high in silica. It has no bond, and in order to make a mold with it a small quantity of fire

clay, molasses water, or other material is added for binder. The size of the sand grain varies with the work to be done.

**Iron-molding sand** or foundry sand is siliceous sandy material used in foundries for making molds and cores for casting molten iron. It is usually of some shade of brown, may be clayey, loamy, or sandy, fine or coarse grained, and has strong bond when moist. From 3,000,000 to 5,000,000 tons is used annually.

**Brass-molding sand** includes sand used for molding brass, bronze, and aluminum. This is a very fine grained sand with strong bond which will take sharp detailed impressions and give a smooth surface to the casting. Articles for war use cast in these metals are numerous.

**The manufacture of glass** might at first thought be considered a nonessential industry with relation to war, but no sooner did this Nation enter the conflict than there was found to be a shortage of optical glass for range finders, field glasses, cameras, and surveying instruments. The making of optical glass was undertaken by the Government in cooperation with existing glassworks. The sand required for this work is small in quantity but important. How many people who are dependent on eyeglasses for clear vision are aware that sand is the principal component of the lenses? Sand composes 60 to 75 per cent of all glass, and more than 2,000,000 tons of glass sand was used in the United States in 1916. Glass is used in war for many purposes, ranging from plate glass for portholes and companionways on transport and battleships to cheap green-glass insulators for electric-transmission lines, from lenses in periscopes to electric-light bulbs and clinical thermometers. Fortunately for our large need, the supply of glass sand of all grades is abundant, and methods of making glass for optical use as well as for other purposes are now well understood.

**Grinding, polishing, and blast sands** have a part in the conduct of war in making smooth the rough places on metal, glass, stone, and other hard substances. Blast sand is clean tough sized sand, with either round or angular grains, which is driven by compressed air through a hose for such purposes as cleaning metal castings and dressing stone. In gun shops, locomotive and car shops, and most places where heavy metal castings are made the sand blast



is used to clean off parts of the mold that adhere to the castings. The size of sand used is varied with the character of the duty to be performed.

**Fire or furnace sand** is highly refractory silica sand for lining furnaces and ladles used to contain molten metal and so has a place in all foundries. About 500,000 tons is used annually in the United States.

**Highways and railroads** are built, ballasted, and repaired with sand and gravel. Many millions of tons of sand and gravel are used on the roads and railroads of this country, and readily available supplies of this material enable the roads to support the heavy traffic in war time. Sand is carried on all locomotives to increase the friction on slippery rails and so plays a not unimportant part in transportation. Engine or friction sand reported annually as used in the United States amounts to about 1,250,000 tons. It must be dry and for best service should be fairly even grained, tough, and sharp.

**Filter sand and gravel** are fairly pure quartz free from dirt, dust, organic matter, or other impurities, sized, and containing not more than a very small percentage of soluble minerals. They are used for beds in water-filtration plants and in filters for other liquids. As the used sand does not wear out or deteriorate, practically all the demand, which is not large, is for new filters rather than for renewal. Water for some of our military camps passes through sand filters.

There are many other uses of sand, some closely and others more remotely connected with the activities on the battlefield. Sand in bags is used for protecting buildings and works of art in cities under gun fire and for balloon ballast. Fine, clean sand is employed in the care of pigeons and canaries used as messengers and gas detectors in the trenches, and sand bags form the parapets of many lines of defense.

#### Trade Conditions

Many sand and gravel producers in all parts of the country report that trade was much better in the first half of 1917 than in the second half. The entry of the United States into the world war in April, 1917, and the consequent temporary unstable business conditions, followed by Government restrictions of shipping, resulted in a decreased production in sands for some uses, especially for buildings and roads, toward the end of the year. The scarcity and cost of labor and coal and the shortage of freight cars seriously impeded the production of sand. The larger producers in several of the Eastern States agree that the demand was the greatest ever experienced, but the sales were restricted by the above-mentioned conditions.

A tabulation of 736 reports from producers in six leading States shows that of this number 353, or 48 per cent., considered business conditions better in 1917 than in 1916, 24 per cent saw no change, and 28 per cent handled less material. In Ohio and Pennsylvania the trade was especially brisk.

#### Production

In 1917 the total quantity of sand and gravel produced was 76,419,325 short tons, valued at \$35,296,932, as compared with 89,091,732 tons in 1916, valued at \$29,809,995.

Reports were received from about 2,500 producers throughout the United States.

**Glass Sand**—Although the quantity of glass sand produced in the United States passed the 2,000,000-ton mark in 1916, it fell below that mark in 1917. The production was greater, however, than in any year previous to 1916. The value of the total output, on the other hand, increased largely, exceeding \$2,500,000, although in no previous year had it reached \$2,000,000. The average price per ton in the last seven years has ranged from \$0.85 to \$1.06, but in 1917 it rose to \$1.38, owing to the increased cost of labor, machinery, and fuel.

The principal producers of glass sand in order of output are Illinois, Pennsylvania, West Virginia, Ohio, Missouri, and New Jersey.

**Molding Sand**—The molding-sand industry has reached such volume (4,660,968 tons) that the decrease of 1,681 tons from the production of 1916, as shown in the data compiled, is negligible. This small quantity may be covered by the failure of one producer to report, or it may be silica sand reported as foundry sand which might have been credited either to steel-molding sand or to furnace sand. The great increase in total value (\$4,303,809) and in the average price per ton from 69 cents to 92 cents, or 33 per cent, is notable.

Ohio was the leading State in the production of molding sand, as in 1916. Pennsylvania, however, dropped from second to fourth place, Illinois becoming second and New York third in order of production.

**Building Sand**—The recorded production of building sand in 1917 was 25,374,987 short tons, valued at \$9,837,688, a decrease of 1,818,475 tons in quantity and an increase of \$1,268,013 in value. It is presumed that statistics will show a greater decrease in production of building sand in 1918 because of the restrictions on building throughout the country. Although there is a very large increase in the production of sand and gravel for building in some localities, particularly at isolated places where large Government construction work is in progress, it is believed that this will

not counterbalance the decrease through the country as a whole.

New York led in the production of building sand in 1917, with an output of more than 3,800,000 tons; Illinois was second, with 2,500,000 tons; and Ohio and Pennsylvania ranked third and fourth.

**Grinding and Polishing Sand**—The total production of grinding, polishing, and blast sand in 1917 was 1,179,190 tons, or only a little less than in 1916. There was, however, a very considerable increase in value, the total amount being \$1,220,708, as compared with \$889,651 in 1916. The average price per ton for all sands under this head was 65 cents in 1916 and \$1.04 in 1917. Pennsylvania, Illinois, New Jersey, and New York were the leading producers in the order named.

**Fire or Furnace Sand**—The total production of fire or furnace sand in 1917 was 604,035 tons, valued at \$695,455, as compared with 426,654 tons, valued at \$384,738, in 1916. Pennsylvania, Ohio, New Jersey, and Illinois were the largest producers. The average price per ton was 34 cents in 1915, 90 cents in 1916, and \$1.15 in 1917.

**Other Sands**—There was a slight increase in the quantity of engine sand reported, and a large increase in value, caused by an increase in average price from 37 cents in 1916 to 59 cents in 1917. Pennsylvania reported by far the largest production, or more than three times that of Illinois, which ranked second. Paving sand showed an increase in both quantity and value and would have been reported in larger quantity had not the use of freight cars for transporting sand and gravel been restricted in the latter part of the year. Filter sand, reported separately for the first time in 1916, fell off in 1917, the production being 62,170 tons, valued at \$47,351, as compared with 76,053 tons, valued at \$68,340 in 1916. There was a small reduction in both quantity and value of railroad ballast reported to the Survey, and a reduction of about 7,000,000 tons in quantity of gravel produced for all purposes, but the total value of gravel produced was more than \$1,300,000 greater than in 1916.

**Chats and Cherts**—The tables of production compiled do not include a considerable quantity of chats or tailings from the Missouri zinc mines. This waste product, which is used on roads, has a nominal value equal to the cost of loading. The shipments of chats in 1917, as reported by the Missouri Bureau of Geology and Mines, amounted to 1,426,716 short tons, compared with 2,890,970 tons in 1916. Of these shipments in 1917, 1,055,972 tons were from mines in southwestern Missouri and 370,744 tons from mines in southeastern Missouri. More than 1,000,000 tons of this material is be-

lieved to have been used for railroad ballast, and the rest for other purposes, such as road metal and concrete.

Neither do the tables include between 15,000 and 20,000 tons of chert dug in Alabama and valued at more than \$11,000.

**Imports**—Sand valued at \$142,586 was imported into the United States in 1917, as compared with imports valued at \$87,144 in 1916. This is largely building sand brought to the United States from Canada as a near source of supply or brought as ballast from overseas. The

imports usually include a small quantity of French molding sand used for making fine bronze castings, refractory sand from England for lining certain iron furnaces, and sands adapted to special uses and brought in small quantity. This importation of sand from abroad is for the most part nonessential but is done because molders, foundrymen, or others of foreign birth learned their trade with a foreign sand and are averse to using other sands than those with which they are familiar.

**Exports**—In 1916 for the first time the

value of the exports of sand and gravel were recorded separately by the Bureau of Foreign and Domestic Commerce. In 1916 the value of these exports amounted to \$233,310 and in 1917 to \$494,251. No information is at hand as to the quantity of sand and gravel represented by these figures nor as to the character and use of the material. Building sand went to Canada from the Great Lakes and Canadian boundary rivers as a convenient source; the character of the material sent to other countries is not known to the writer.

# The Value of a Cost Accountant to a Sand and Gravel Firm

Is Connecting Link Between Production and Sales—Some of the High Points in Correct Accounting for a Sand and Gravel Plant\*

**MY PURPOSE** will be to show that the accounting department of the present-day sand and gravel business can be made as valuable an essential to the business as the producing or selling departments.

Just what part the accountant plays in making the sand and gravel business, or any business in fact, profitable I am going to explain as I see it, after fourteen years' experience in accounting.

In the first place, to speak correctly, there is no such person as an Expert Accountant. We often hear men called Expert Accountants, but at the most, they are only specialized accountants for accounting is too broad a field for a person to become an expert in all its branches. Cost accounting, for any particular business, can only be intelligently applied after an exhaustive study of all conditions that govern that particular business.

## Avoid Too Much System

Do not confuse the real cost accountant with the person that believes in system for its own sake. System is merely a means to an end, and it should produce the desired result with a minimum of effort.

If the work in the office seems to be too heavy for the present force, see if there is any waste motion anywhere. Cut out everything that is not useful now. If a machine, such as an additional typewriter, adding machine, mimeograph or addressograph will save enough time for the present force to do the work, buy that machine.

Too many, who call themselves accountants are only bookkeepers. Unless you can take charge of an office and install a trial balance system, showing

By Tom P. McGrath  
McGrath Sand and Gravel Co.,  
Lincoln, Ill.

a statement of assets and liabilities, and a trading profit and loss, you are not an accountant. A system of books that does not show all these, makes an operator a dangerous competitor and is a drag on the entire industry.

The accountant is very much like the governor of an engine, that moves quickly and quietly in its own sphere, and all the time keeping a check on the rest of the machine.

The accountant is the connecting link between production and selling. Without his services, the business runs itself in a haphazard, blind-folded way, not knowing whether it is making money or losing. Whether or not your business is making a profit, depends upon whether you are getting for your marketed product all that it cost you to produce and sell it, plus a reasonable profit. Now there is only one way of knowing whether you are getting back expense plus a profit, and that is through a thoroughly efficient cost-accounting system.

If an operator employs a person to give him a system that will furnish a true and correct statement of his costs and liabilities and assets, and he is not qualified to do so, then he is imposing upon the entire gravel industry. But if he is able to do that, he should not be considered an expense item (as he usually is), but as productive and as valuable as the manager of production or selling.

\*This paper was prepared for the meeting of accountants of the Illinois Sand and Gravel Producers' Association, held at the Illinois Hotel in Bloomington, on February 25th, 1919.

ble as the manager of production or selling.

Suppose you figure the cost and fail to take every item into account. Then the operator loses the amount of the item or items because if the selling price shows 60 cents and the cost 40 cents, when in reality the cost is 45, the operator is losing 5 cents on every ton sold. If the average legitimate profit per ton is 20 cents and your system of accounting is off 5 cents a ton, then through your inefficiency your salary is not only being wasted, but 25 per cent of the profit. Furthermore, the company that knows its cost of production is operating at a disadvantage against this kind of competition. A low selling price, because of ignorance of production cost, injures the operator directly involved by robbing him of his fair profit, and tears down the entire sand and gravel industry.

## High Points in Sand and Gravel Plant Accounting

Here I will enumerate just a few of the things that every accountant in the sand and gravel business should look out for.

**Liability Insurance**—Present statement to your insurance agent of losses sustained during the years of operation, and if losses are low and the rate is high, keep on the subject until an experience rating is given.

**Fire Insurance**—The same thing applies here. If all the operators have this matter up, we will have more success in getting a reduction in rates.

**New Accounts**—Immediately upon the opening of a new account, get a rating and preserve it.

**Collections**—Use a good follow-up sys-



tem. Be able to write a good letter, and not one of the rubber stamp kind. A good letter is short and direct, diplomatic and at the same time, convincing.

**Bookkeeping**—Trial balance system, statements of assets and liabilities, and trading profit and loss, as often as necessary to keep in touch with the condition of the company, at least once a month.

**Operation**—Watch the daily tonnage report. If not up to standard, notify the Manager of Operations, and then it is up to him to correct the fault.

**Banking**—Watch your bank account and never overdraw it. It is a bad habit and destroys credit.

**Stripping**—The cost of stripping, or overburden, should be placed in Miscellaneous Assets, and monthly charges made against this account in accordance with the amount of stripped surface consumed.

**Bad Accounts**—When every means to collect an account has failed, charge it off. Then if later on the account is collected, apply it to earnings of the current year.

**Taxes**—The accountant should familiarize himself with the normal income, excess and war profit tax exemptions, allowances and deductions as they affect his own line of business.

**Depreciation**—The rate of depreciation should be arrived at in the same way as an experience insurance rate is figured, namely, if the average life of your plants in the past has been ten years, the depreciation should be charged at ten per cent of the original cost. A replacement reserve account should be opened and credited with the amount charged to depreciation. If the replacement reserve becomes equal to the original cost of the plant, no further charge.

**Obsolescence**—In case the plant becomes obsolete before the replacement reserve has become equal to the original cost of the plant, the difference between the replacement reserve and the original cost, minus the salvage value, should be charged to obsolescence.

If you are operating a plant whose normal life is ten years, on property on which you have a lease for only five years, without privilege of extension, then a yearly charge of 10 per cent for depreciation and an additional 10 per cent for obsolescence, making a 20 per cent charge against the original cost, should be made.

**Repairs and Supplies**—When repairs and supplies are brought to maintain the plant in operation, they should be charged against expense, and not entered under assets which would show an increased valuation of your plant.

**Depletion**—The depletion charge allowed by the government in computing taxes, is based upon the cost of the

gravel property, plus the cost of that part of the property that the plant, equipment and switch tracks occupy, from under which the sand and gravel cannot be excavated.

#### Ordinary Items of Expense of a Sand and Gravel Co.

##### ADMINISTRATIVE

Bad Accounts  
Taxes  
Depreciation of Office Furniture and Fixtures  
General Expense  
Interest and Exchange  
Manager's Expense  
Office Rent  
Office Supplies  
Postage  
Manager's Salary  
Office Salaries  
Insurance  
Telephone and Telegraph

##### SELLING

Salemen's Salaries  
Traveling Expenses  
Auto  
Commissions

##### OPERATING

Labor  
Repairs and Supplies  
Coal  
Power  
Freight  
Drayage  
Switching  
Liability, Fire, Tornado and Boiler Insurance  
Royalty or Depletion  
Demurrage  
Stripping  
General Expense  
Depreciation of Plants and Equipment  
Obsolescence

## Enthusiastic Convention of Iowa Gravel Men

DES MOINES, I.A. —Enthusiasm among sand and gravel producers of Iowa is so great that at the third annual convention of the state association held here February 27 and 28, the attendance represented almost every gravel man in the commonwealth.

Officers were elected as follows: President, R. C. Fletcher, Flint Crushed Gravel Co., Des Moines; vice-president, C. H. Boynton, Northern Gravel Co., Muscatine; secretary-treasurer, C. V. Ray, Capital City Sand Co., Des Moines.

A constructive program was adopted and committees were appointed to carry through the program. These committees are on specifications, railroad freight rates, membership and other subjects.

A resolution for the organization of a credit rating department was adopted. The membership fee was fixed at \$20 a year with an assessment of one-half mill per ton on production.

The interest of all who attended was so earnest that all believe the association will accomplish great things this year.

## Some Things the Illinois Gravel Association Plans

VIRTUALLY EVERY SAND and gravel producer in the state outside of the Chicago district is a member of the Illinois Sand and Gravel Producers' Association, a testimonial to its potent influence and its value proven wherever it has sought members. No effort has been made to obtain members in the metropolis.

Recently the organization outlined a large program of activities; it employed a business director, Ben Stone, a traffic man with many years experience in railroading.

Some of the duties of the business director are:

Compiling and keeping for members a full set of railroad tariffs.

Working out a uniform cost accounting system.

Doing promotional work with city, township, county and state highway officials.

Representing the association in legislative matters.

Harmonizing the interests of the members.

Installing a credit bureau.

Mr. Stone and the auditors of many of the leading companies have worked out a monthly cost of production statement which each company in the association will fill out for him and from which he will be enabled to prepare a monthly table for distribution among the producers showing comparative costs. No plant will be identified in the report but it will enable each producer to compare his results with the others reporting. His office is in Springfield.



Ben Stone  
Business Director of Illinois Sand and Gravel Producers' Association



# Several Processes of Nature for Making Sand and Gravel

Professor R. D. Salisbury at National Association Convention Gives Instructive Lecture of Interest to Producers of Mineral Aggregates—A World of Solid Stone

PROFESSOR R. D. SALISBURY of the University of Chicago gave a very enlightening talk on the origin of gravel and sand at the annual convention of the National Association of Sand and Gravel Producers, January 28. He illustrated his remarks with lantern slides. The following is an abstract of his remarks:

## Rock the Basis of Gravel

Contrary to the popular belief the earth is mostly rock, and in this rock is the source of gravel. All deep valleys are in solid rock; and all the rock removed in making valleys, has the possibility of having become gravel.

Most kinds of rock when broken up may make gravel. Many kinds are crushed for commercial purposes, and any kind which is useful when crushed, may make gravel, barring that rock which is ground, rather than crushed, as for cement.

Many sorts of rock enter into the composition of gravel. All that is necessary is resistant material. Therefore clayey varieties are not made into gravel. Crushed rock is angular, and all of one kind as a rule; gravel is rounded and commonly of various kinds.

## Stones That Make Gravel

For commercial purposes, few sandstones and almost no shales are crushed for use as crushed stone, and as a rule, these sorts of rock do not make gravel.

Limestone, quartzite, and various sorts of igneous rocks are crushed, and the products used as crushed stone. All of these kinds of rock make gravel. Limestone is of varying excellence for crushing purposes, depending largely on its hardness. Igneous rock varies much in quality, and the crushed rock and the gravel derived from it vary correspondingly.

## Nature's Principal Methods

Gravels are made chiefly by streams and waves. The process is simply the rolling of pieces of rock over and over by streams, or back and forth by waves, or their wear by the carriage of other gravel and sand over them.

In the process the softer parts of the rock are worn out; that is, they are ground up and become sand or mud. The harder parts remain in large pieces,

and make the gravel, simply because they are not worn out or ground up so readily by waves and currents. Softer sorts of rock, like shale, make a sort of gravel close to the place of origin, but before shale bits are carried far, they are ground up into mud.

A stream gets pieces of rock from all the rock formations which come to the surface in its basin, but only the harder ones appear in the gravel far from the place of origin.

## Rock Broken by Nature

Deep cracks are made by crustal movements. These cracks become lines of weakness and promote breaking of rock. Surface breaking of solid rock is effected especially by freezing of water in cracks, and by expansion and contraction, due to changes of temperature. From cliffs, such material is broken and falls down, forming talus. Talus is like crushed rock, except that the size of pieces is much more variable.

Talus is abundant at the bases of cliffs, especially at the bases of mountain slopes in dry regions. As it is not generally available for commercial purposes in these places it accumulates, unless carried away by water. In places, as in Nevada, the piles are thousands of feet deep at the bases of some of the high, steep cliffs.

## Gravels From Talus

Gravel is made from talus or other broken rock by streams and waves. If talus falls from cliffs into a river valley, the river carries it off. If the talus is from a cliff along shore, the waves wear and round the material.

In the making, the weak, soft parts of the rock are worn out and disappear as mud. Thus the Colorado River has gravel in its bed in the mountains, but the mud which it gets in the mountains, or which it makes by grinding up the coarser material, is carried to its mouth, and has made the great delta of the Colorado, across the head of the Gulf of California.

The harder parts of the talus are carried along; are rounded as they go, are reduced in size, but for a long distance remains, as boulders, cobbles, or pebbles. In the end, if carried far enough, they are worn out. As pebbles

and cobbles the pieces of rock are carried in some cases hundreds of miles.

Gravel is thus produced in quantity along streams which have access to talus. If the talus is along the shore of a sea or a lake, gravel is produced from it also. If rock is worn from the cliffs by waves, that also is made into gravel.

The harder parts of rock made into gravel may be the fresher, unweathered parts of the rock, or they may be the harder constituents of the rock, if the rock was made up of unequally hard materials, as some rocks are.

## Harder Constituents in Rock

Chert is abundant in much limestone, as, for example, in the vicinity of St. Louis, in some parts of Tennessee, in places in Southwestern Wisconsin, and in many other regions where limestone is a surface formation. As the limestone dissolves, the chert in it accumulates on the surface, and in valleys cut in the limestone. Surface accumulations give rise to good natural roads.

In some places, as in southern Illinois, there are thick beds of chert, much broken up and worked under the name of gravel.

Quartz veins are abundant in some metamorphic rock, such as schists, slates, etc. As the rock weathers and decays, these veins, being resistant, remain, and give rise to angular pieces of hard rock on the surface above the vein. Such surface accumulations of quartz on the surface over a vein below, are known to miners as "croppings." By stream action, these quartz pieces are broken and rounded. The material is very hard. Abundant material of this sort is found in parts of the Atlantic coastal plain, where it has been transported by streams from the Appalachian Mountains. It is abundant, in general, on plains adjacent to mountains, though in many such situations, the gravel is not limited to quartz, but is made of all sorts of hard material in the mountains. Such materials are found abundantly at the eastern base of the Rockies, the Andes, etc.

## Glacial Gravels.

Glaciers gather material, coarse and fine, from all rock formations they pass over. An ice sheet once covered this region (north central states) and many

sorts of rock appear in the drift which it left.

#### Glacial Streams

Streams from glaciers carry away much glacial debris. The fine material, the rock flour, is carried far, while the coarser materials, pebbles, cobbles, small boulders, are rounded and transported shorter distances down valleys. Here again the harder materials remain and the weaker go, but glacial gravel is of various kinds of rock, and for many purposes this is a good quality.

Valleys which led from the ice were, as a rule, the sites of abundant deposits of gravel and sand, and a large part of the gravel used in this part of the world was deposited by streams flooded by the melting ice, when the great ice sheet was here.

These valley fillings are of the same age as the glacial drift. There is much glacial gravel which is not in valleys, but was deposited at the edge of the ice. The hills at Forreston, Ill., and south-east of Rockford near Cherry Valley, are illustrations. In general, gravel is abundant at spots in terminal moraines.

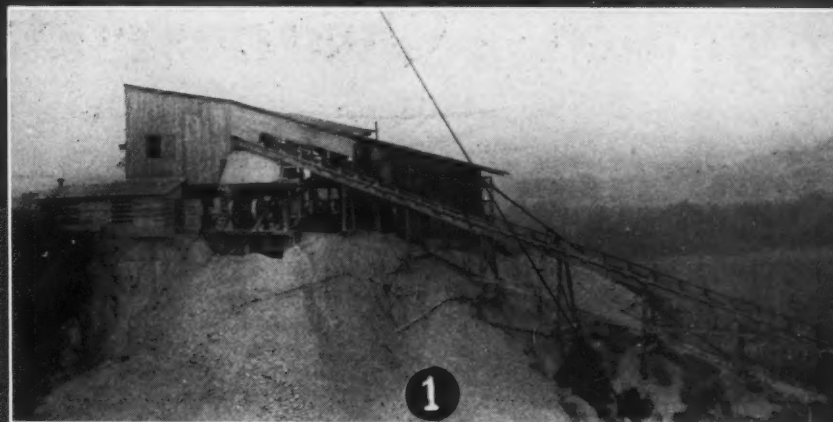
The ideal gravel for road material should contain much hard tough material, such as granite or quartz; some that is less hard and which will crush under the wheel, and serve as a binder for the remainder. The soft part may be bits of decayed rock (as on Atlantic coastal plain); or it may be loam mixed with the gravel. When a binder is absent in the gravel as it occurs in nature, as it is in many cases, it may be supplied. Bog iron ore is one of the best materials. This however is especially bad in gravel used for cement purposes.

#### Gravel Plant With Widely Separated Units

THE Tarco Construction Co., Cincinnati, Ohio, sand and gravel producer, has an interesting drag-line plant at Fernald, Ohio. The striking feature of this plant is the way in which the various units are separated, as shown in the accompanying illustration.

Fig. 1 shows the screening and washing plant on a high bank bordering the Chesapeake & Ohio Ry. Gravity loading bins are built into the far side of the bank. A belt conveyor about 200 ft. long carries the material to the plant from the pit.

Fig. 2 shows the power plant and the hoist for operating the drag-line. Fig. 3 shows the pit and the drag-line mast. The pit is 600 ft. across. The drag-line is operated from the hoist shown in Fig. 2, which view was taken from the foot of the mast. Fig. 4 shows the tram car and dumping hopper in the pit. The scraper bucket loads a car which is hauled to the hopper by the hoist shown at the end of the track. The hopper feeds the conveyor in Figs. 1 and 2.





# Operation of Quarries and Crushing Plants

## IV—Stock-Piling Equipment

**B**Y WAY OF PREPARING for the big business this season, which all producers of crushed stone are confidently and with good reason looking forward to, there is no more efficient method of increasing the season's output than by accumulating a surplus of finished product during the idle spring months to supply the summer and fall demand that is sure to exceed the capacity of plants in all territories. A discussion of devices for storage piles and their adaptability to different conditions should prove of special interest at this time.

The cost of stocking and reclaiming depends on the quantity to be handled as does the choice of device. Whatever that cost may be, it is worthy of note that the plants provided with a stock-pile are almost uniformly successful: they make money where the others fail. The fact is that the cost of handling this reserve stock, which in no case needs to exceed 15 cents per ton, is more than offset by cheapened production when operating to capacity. The crushing of a surplus during otherwise slow months costs little or nothing; the investment in the stock-pile is merely in blasting and loading the quarry product and wearing parts, little or nothing for operating the plant, or for fixed charges.

### Steadies Market

Successful operators, large as well as small, have resorted to stock-piling. It steadies the market; there is no scramble to dispose of this size or that size at cer-

**By R. W. Scherer**  
Supt. of Quarries, Union Lime Co.,  
Milwaukee, Wis.

tain seasons, and no necessity to sacrifice on any part of the product in order to move it; it can be held for a better market. In limestone quarries the demand for screenings for agricultural purposes, unseasonable as it is to the producer, can be fully utilized only by means of a stock-pile and the more stable if not higher price for this commodity can be taken advantage of.

A stock-pile is in itself a selling argument; it is positive proof of ability to deliver and to a contractor anxious to avoid costly delays, this is the big appeal. There are few crushing plants that would not benefit from a stock-pile, in fact no commercial producer with a seasonable demand can afford to be without it. It is safe to say that 30 per cent of the estimated season's output should be in reserve by June 15th, and the possibility of producing enough in half a season to supply the annual demand should be kept in mind.

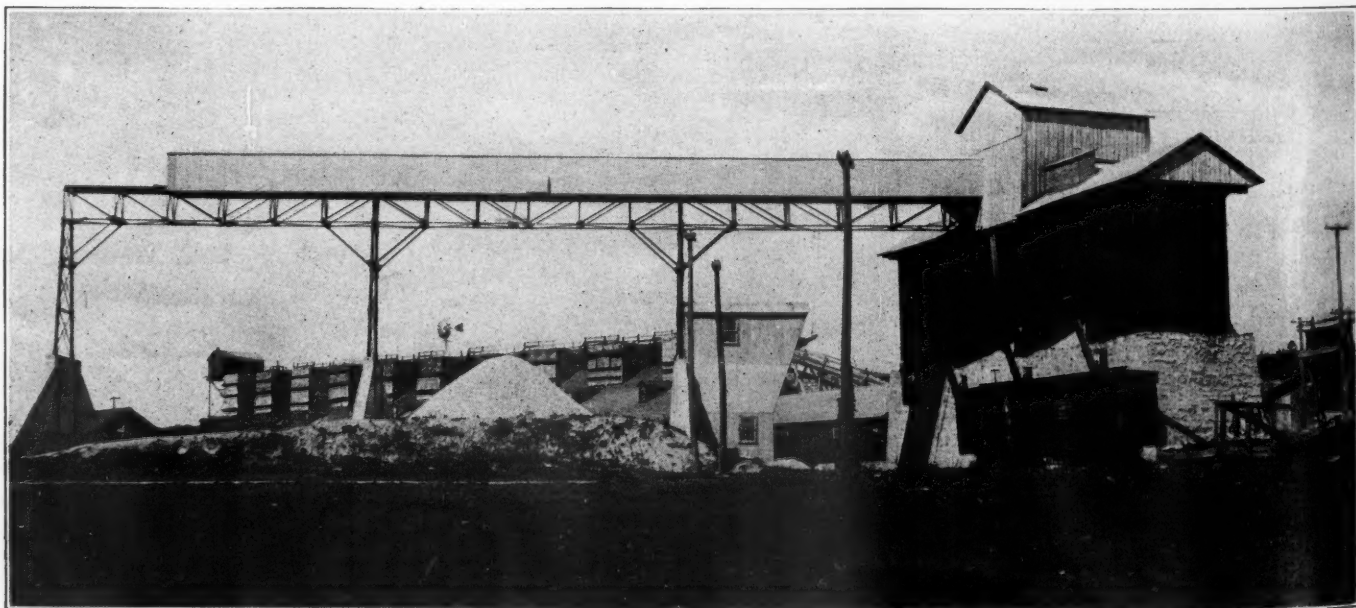
### Bins

Of all devices for storing crushed stone, bins and tanks are the most cheaply operated but require the greatest investment per cubic yard of contents. The cost of loading from bins is negligibly small but they are economical only when in almost daily use; as a

means of storing a surplus from one part of the season to another, when the advantage of cheap loading is gained only once or twice during a season, they need not be considered. Bins to hold the product of three days' operating will prove ample in any plant, and will usually insure steady operation during a temporary car shortage or failure to get cars spotted for a day and other causes of delay. Bin capacity for one day's product can be made to serve admirably, however, in most cases if another stock-piling device is at hand and a plant, provided with conveyors on a trestle, dispenses with them entirely.

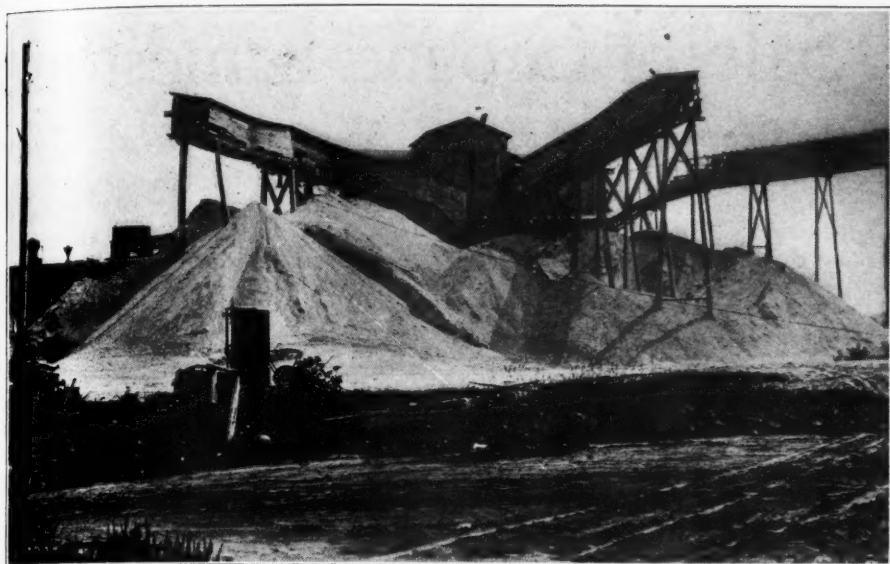
The accompanying illustration shows a recent installation of bins, huge steel tanks 44 ft. in diameter and 40 ft. high on concrete foundations high enough to leave a clearance of 18 ft. from the top of the rails of the spur track. Each bin holds 3,000 tons and has three large bin gates over each of the two tracks. By using several bin gates cars can be loaded so rapidly that they are kept in almost constant motion and it would be possible to load an entire train on each track in less than an hour. In large operations, where rapid loading is essential, bins are indispensable and in small plants it is equally economical to use gravity as much as possible in loading.

In the construction of smaller bin buildings, the erection of costly foundations can as well be avoided by placing the bin gates on the side of the building, allowing the stone to rest on the ground and merely confining it by



Ground storage from trestle equipped with two belt conveyors





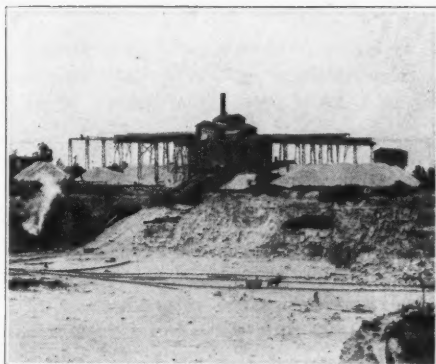
Ground storage with six radiating conveyor trestles

the cribbing. The tendency of wood bin floors, exposed to both air and moisture, to rot makes their maintenance expensive. Railroad companies are increasing the height of clearance demanded in overhead structure and instead of raising the bins or instead of repairing rotten bin floors, it will often be found practicable to tap bins from the side though by so doing not quite as much of the contents can be removed by gravity as when the bin is emptied from underneath.

#### Ground Storage

An appliance for stock-piling that requires less investment per yard of capacity but is a little more costly to operate is the belt conveyor on a trestle and a tunnel under the pile provided with another conveyor to reclaim the material. The height of the upper belt greatly influences the cubic contents of the pile that can be deposited by the belt, as the cubic contents of the pile vary not as the height but as the square of the height so that a pile 20 ft. high will hold, not twice as much but four times as much as a 10-ft. pile; a pile 40 ft. high is sixteen times as large as the 10-ft. one. There being so much gained by elevation it would be well to let the belt rise from the point where it receives its load to the point of discharge at an angle, and one of 20 degrees is practicable for carrying stone on a conveyor belt.

Provision must be made in such a plant for carrying several sizes. In one large plant six such conveyors are used radiating from the screen room, each carrying a different size and each provided with its tunnel and conveyor. The upkeep of these belts, particularly those underneath, has proved a considerable expense. In this case this ground storage replaces bins; while it has been



Quarry view of same plant

found more economical than the latter, upkeep and cost of operating are by no means negligible items. The plant ships its entire product by boat and needs to be able to load at once 1,100 tons or more, often of the same size, and this decided the owners for this method of storing.

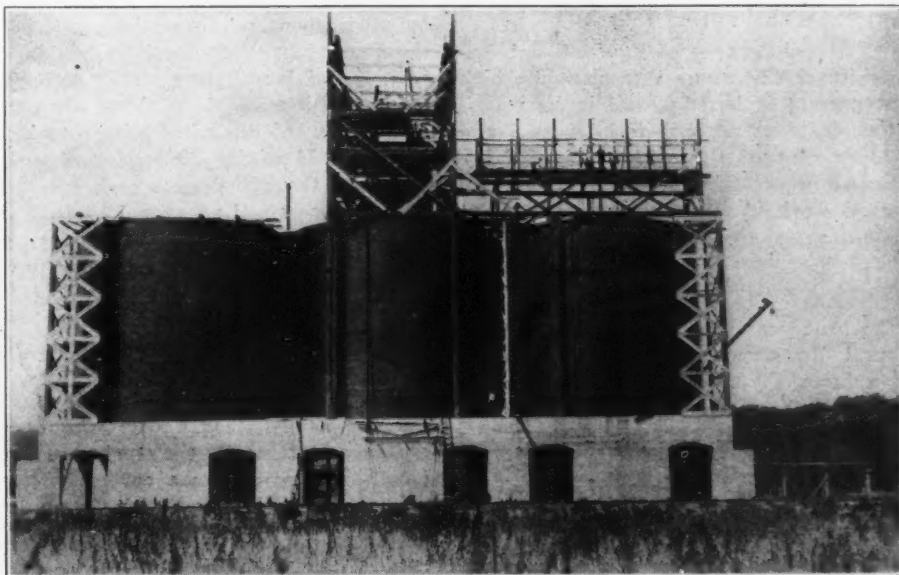
In another plant two belts are carried on the same trestle and constantly operated while stock-piling. One belt in the tunnel conveys either size back to railroad cars. To obviate the necessity for several belts a good plan is to tap the bins in the plant to a belt conveyor that carries the stone to an elevator which in turn deposits on the trestle. By this means the contents of alternate bins can be carried out and deposited at any desired point under the trestle.

Under the most favorable conditions the first cost of such a plant can not be kept much under \$2.00 per cubic yard of capacity. For using once in a season, the cost of interest and depreciation would have to be borne by a single yard and for such storage first cost will prohibit its use. It is to be remembered also that only one-half of a prism-shaped pile can be recovered by gravity: of a conical pile only one-fourth will drop to the lower conveyor. On the other hand a contrivance could easily be rigged up with a cable scraper and small hoisting engine or horses which would indefinitely increase the size of each pile at very small expense by simply pulling it apart when accumulating material. It can as easily be scraped back to the gate when reclaiming the pile.

Numerous other devices will be discussed in a future article.

#### Governor Has Unique Method of Encouraging Building

Governor LOWDEN of Illinois is reported to have told the legislative price investigating committee that he is in possession of information "which would indicate that the state could produce cement for \$1 per bbl., while the best quotation the state can get is \$1.85 per bbl." All this helps immensely to hasten the construction program.



Steel storage bins holding 3,000 tons each

# Promotion and Sale of Ground Limestone

## Summary of the Opinions of the Leading Producers on Association Work, Sales Methods, Collections, Freight Rates, etc.

**H**OW MAY THE UTMOST ADVANTAGE be taken of the educational and publicity work of the national and state agricultural authorities in promoting the use of agricultural limestone? The most obvious answer, of course, is promotional work through a national association.

Of 28 representative producers covering the entire country from California to Connecticut and south to Louisiana 18 are unqualifiedly in favor of a National Agricultural Limestone Association. The producers thus favoring a national organization are about equally divided between those who have already had experience in association work and those who have not.

Four of the 28 producers are unqualifiedly against a national association. One of these believes that the work should be handled as a side line of the National Crushed Stone Association. Five other producers give qualified approval to a national organization, but bring out the point that the problems of agricultural limestone promotion are to a large extent local.

Nearly all the producers recognize the importance of the local association, and all but three of those who favor a national association favor a local association also. In fact all producers who do not believe in a national association, with the exception of two, are unqualifiedly in favor of local associations. One large producer who has had much experience in association work believes there should be a "national organization to promote general interests" and a "local organization to promote sales."

The maintenance of the National Agricultural Limestone Association, which at present is largely local in its activities, costs its subscribers between 1 and 2 per cent of the selling price of the limestone—certainly a small item for the good work already accomplished.

### Sales Methods

Eleven of the 28 producers employ field salesmen. These include all but two of the producers who have placed agricultural limestone among their principal products. With the others it is more of a side line. Of the two large producers who do not employ field men one sells largely by mail and the other through agents. The cost of maintaining field men varies all the way from 4 to 30 per cent of the selling price. The producer with the 4 per cent cost is one of the largest. From the number of re-

turns between 7 and 12 per cent, a fair selling cost through field men is apparently about 10 per cent of the selling price.

Selling through mail orders—the result of circularizing and advertising—is popular with 17 of the 28 producers. Indeed 13 make all or practically all their sales by this method. The cost of circularizing and correspondence costs all the way from 1/10 of 1 per cent to 5 per cent of the selling price. Apparently 1 per cent is a fair allowance for this promotion and selling cost.

Advertising in newspapers and periodicals is practiced by 18 of the 28 producers, by some however, only occasionally. The cost of this advertising in farm and agricultural papers costs all the way from 1/20 of 1 per cent to 6 per cent of

### Advice of 28 Experts

**T**HE matter given here is the expert opinion of 28 prominent producers of agricultural limestone—they represent a production of 1,500,000 tons per annum.

the selling price per ton. The producer who spends about 6 per cent of the selling price in advertising is one of the largest and most successful. Few of the producers spend over 1 per cent on advertising.

### Sales Through Dealers and Agents

It is evident the dealer or agent problem has never received the attention from producers that it deserves. Well posted county agricultural agents have said that the chief obstacle to the introduction of agricultural limestone was the difficulty of making it available at times when the farmer wanted it, or had leisure to haul it. Only 13 of the 28 producers make any sales through dealers or agents. A few producers sell an annual tonnage of from 30,000 to 60,000 tons without the assistance of dealers or agents, but practically all the large producers who have specialized in agricultural limestone have found no better way of solving the selling and distribution problem.

Only nine producers who employ dealers and agents have agents who carry stocks, and generally the stocks are very small—not more than a car load.

### Amount of Commissions Allowed

Commissions paid to dealers and agents vary from 5 to 50 cents per ton. Most of the producers pay 25 cents per

ton. Some have a bonus system or graduated scale, the more the agent sells the more his commission. At current prices of bulk material evidently 10 per cent of the selling price is a fair allowance for all stone sold through agents and dealers. In most cases it is customary for the producer to fix the price and pay a fixed sum as commission, although in a few cases the price is made to the dealer and he sells at his own price. This, however, appears to be poor practice.

One difficulty with the producer has always been to determine when the agent is not an agent. In other words farmers acting as agents have sometimes taken advantage of the agency to get all their own material at a discount, but have sold little more. Very few producers fix any minimum amount per annum which an agent must sell to preserve his status as an agent. The lowest minimum assigned is 40 tons (about one car) and the largest 25 cars or 1,000 tons. Another big producer fixes a 200-ton minimum.

Only seven of the producers have found the agency method satisfactory and are willing to recommend it. These include all who fix a minimum tonnage for their agents. Apparently one of the drawbacks to the agency method is the one already referred to in not fixing this minimum.

Selling through farmers' granges is condemned by 17 of the producers. The remaining 11 make some sales in this manner, but only three allow commissions to the grange or the grange officials. In these cases the commission is the same as that paid to regular agencies. One large producer allows a small discount which all the purchasers share, where orders are placed through the grange.

### Bulk Material In Less Than Car-Load Lots

The sale of agricultural limestone in bulk to customers desiring less than a car load is one of the big problems to be solved. Only nine of the 28 producers attempt to sell railway shipments of bulk material in less than car load lots. These nine are able to do this only by getting some one of a group of farmers to assume the responsibility for the entire shipment and to take care of the distribution. One large producer states that the plan is not feasible unless it is done through regular agents. With one exception all the producers who sell bulk



material in less than car-load lots have such agents.

The terms for payment of such dividend bulk shipments vary all the way from cash to 90 days. One producer accepts trade discounts.

Keeping stocks of bulk material on hand at shipping points in the country for prompt delivery of out-of-season orders has received consideration by nine of the 28 producers of whom only three believe that the plan is feasible. The objections raised are that too much capital would be required, and that the distribution is not part of the quarryman's business. Many do not believe that the business has reached such proportions as to justify the scheme unless the burden is assumed by the farmer organizations and not by the producer.

#### Collection Methods—No Bad Debts

A rather remarkable feature of the agricultural limestone business is the fact that only 11 of the 28 producers make any investigation of the prospective purchasers' credit rating. Five of these use Dunn, Bradstreet or some other commercial rating bureau; five others get local bank references and one requires his own bank to pass on the farmers' paper before making a shipment.

Only four producers have tried taking trade acceptances. Two recommend this plan very highly, the other two have not had satisfactory experience.

The most remarkable feature of all is that 25 of the 28 producers have never had a single bad debt against a farmer! The other three all state that they have had "very few." Many are emphatic in stating they have never lost a dollar through a farmer's failure to pay.

This is the more remarkable because, as already stated, only 11 of the producers take the trouble to make any investigation of a prospective purchaser's credit. Many make the statement that any farmer who is progressive enough to use limestone is absolutely sure pay. Several state that they would trust any farmer in this class.

#### Terms of Payment

Five producers sell practically altogether on a cash-on-delivery, or sight draft plan. These include some big producers in the Central West. Two sell for cash in 10 days net; ten for cash in 30 days net. Eight sell for net in 30 days with discounts ranging from 1 to 2 per cent off for cash on delivery or within 10 days. Several of the eight discount at a straight 4 cents or 5 cents per ton for cash. Two producers make terms to suit their customers, one taking notes due in the fall, for spring shipments.

#### Promotion Methods That Have Been Tried

The farmer is in the "show me" class apparently. He does not take anything

on faith. Hence the only argument which has always been successful in inducing him to buy his first ton has been to show him what others have accomplished through the use of lime and limestone. One producer says he never talks the "first ton," but always the "first car." Several state that they don't have to do promotional work as the agricultural experiment stations do it for them.

One successful producer states that about five years ago, when he first began grinding limestone, he sent several car loads into different neighborhoods and distributed the material by the ton to many farmers gratis. Since then the material has sold itself in those localities.

#### Selling Expenses

**F**IELD salesmen cost 10 per cent of selling price.

Circularizing and correspondence cost 1 per cent.

Advertising costs 1 per cent.

Dealers cost 10 per cent.

All but five of the 28 producers have given the material away, for demonstration purposes, although some state that they have not done so for several years. Several have given material only to county agents or state authorities. One producer states that all such material was thrown away to all practical purposes.

#### No Bad Debts

**F**ARMERS are sure pay. Not one of all these producers have had any bad debts worth mentioning. No credit investigation necessary.

Fourteen of the 28 producers have exhibits at state or local agricultural fairs—some at both. One large and successful producer makes it a practice to give away 14 or 15 car loads at county fairs as prizes. One producer states that he has tried fair exhibits and that they do not pay; another says that such exhibits are no longer necessary.

Of course all producers agree that the results obtained from its use is the chief cause of the greatly increasing demand of agricultural limestone. Three producers feel that large increases in their own output are due chiefly to their own selling organizations. Eight believe their increased output is due to their advertising and publicity work. Nine believe the state experiment stations and the county agents have been chiefly instrumental in increasing the use of the material. Four producers believe that future output can be increased best by at-

tention to service and quality of the material.

#### Shipping Zones and Freight Rates

The maximum shipping zones of the different producers show great variations. The maximum for three producers in the Central West ranges only from 50 to 75 miles, while one producer in the same territory ships 640 miles. Six producers shipped from 100 to 150 miles under the freight rates existing in 1918 before the 15 and so-called 25 per cent increases. Five shipped distances up to 200 miles. Seven shipped to distances from 250 to 400 miles and one eastern producer ships 500 miles.

The freight increases of last year restricted the shipping zones of many producers. One producer states that the rate increases have reduced his shipping radius from 130 to 60 miles. Others have suffered a 50 per cent reduction in shipping radius, although some who ship long distances have not been affected.

The maximum freight rate agricultural limestone can stand of course depends largely on the price it sells for under competitive conditions. Estimates of this vary all the way from 50 cents per ton to \$2 per ton. Most of the estimates range from \$1 to \$1.50 per ton with the material selling at prices of \$2.50 to \$3.50 per ton. In other words agricultural limestone cannot carry a freight rate of more than half its value; therefore can not carry a much higher rate than ordinary crushed stone.

Eighteen of the 28 producers favor a fair mileage scale of rates. Two are uncertain and two are already shipping on mileage scales. One desires a zone scale and five are unqualifiedly against a mileage scale in any form.

It appears that the states of Connecticut, Illinois, Indiana, Iowa, Kentucky, Massachusetts, Missouri and Wisconsin have all passed laws giving agricultural limestone preferential or especially low freight rates. Of course the taking over of the railways by the Government and the subsequent rate increases nullified the operation of these laws, but they still exist and should, if proper pressure is brought to bear, prove very substantial hooks to hang arguments for freight reductions on.

Producers are urged to work through their state railway or public service commissions in their efforts to prevent further rate increases and to get rate reductions, for according to a statement recently made by Director-General Hines of the Railroad Administration, he will not attempt to put over any further rate increases until they have been submitted to the state commissions.

#### Railway Cooperation

Ten of the producers admit that railway officials have shown some interest in promoting the use of agricultural lime-



stone, although several state that these activities have ceased since the Government took over the lines. Two state that the railway men have taken an opposite course and have actually discouraged the business.

As will be noted from an article elsewhere in this issue a few of the railways are now taking up the matter of promoting the use of lime and limestone in real earnest. The Railroad Administration at Washington also has an agricultural bureau and there is every reason to believe that an organized effort on the part of agricultural limestone producers would secure much helpful co-operation from the railways.

All but two of the producers are emphatically in favor of applying to the Federal railway authorities for special freight rates because it is in the interest of railways as well as of the Government to stimulate agricultural production. Evidently the proper place to make such an application is the Agricultural Bureau of the Railroad Administration.

#### Increase in Rates Would Be Fatal

As one producer puts it agricultural limestone is a commodity which the farmer can, of course, get along without and still be a farmer; therefore any increase in price will seriously retard its further use, and very possibly curtail its present use. (Producers should bear in mind that this holds true also of all the other items which enter into the retail price or the final price to the consumer.)

Several of the producers have suffered a considerable reduction in orders as a result of the freight-rate increases last year. All are practically unanimous in the opinion that any further increases would be a serious handicap, some emphatically declare that any further increase would absolutely kill their business.

The wisest heads all agree that the only effective method of combating a further increase in freight rate is through organization. One producer goes even farther and suggests "standing together and fighting together by National Associations of shippers, farmers, commercial clubs, granges, U. S. Department of Agriculture, State Agricultural Colleges, etc." One producer believes it is a job for the National Crushed Stone Association.

One of the largest and most successful producers "does not favor serious action until a united front can be presented by the whole industry."

The next issue of ROCK PRODUCTS will contain an article you will all be interested in—"The Sale of Agricultural Limestone Through Farmers' Cooperative Societies." That's only one of many good ones in the April 12 issue.

## New Use of Concrete—Freight Car

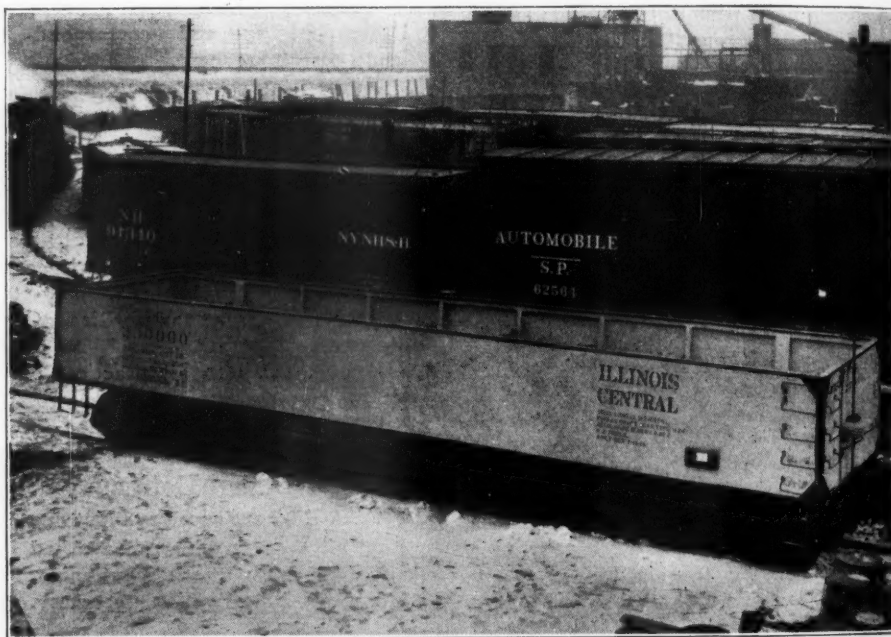
NEW USES FOR CONCRETE come frequently to public notice. One of the latest, and one that promises to be far-reaching, is the concrete freight car.

The beginning of practical plans for the manufacture of reinforced concrete freight cars dates from 1909 when a patent for such a car was granted to Joseph B. Strauss, of Chicago.

On account of the war, construction of a trial car was delayed, and it was but recently that the first car, of the gondola type, was completed by the R. F. Conway Co., Chicago, and tested under service conditions. Not only in the material used, but in its design and the details of construction, it represents an interesting departure from usual methods.

and loaded, demonstrated its practicality for rough service. In the test without load it withstood extremely rough handling in switching, and came through without injury. Subsequently, the car was loaded with fifty-five tons (10% overload) of sand and turned over to a switching crew for service handling. It withstood this test also without injury.

Other merits are claimed for the concrete car. It will not need painting and will practically eliminate maintenance charges. Its life will be much longer than that of the wooden car. It will have the important advantage, also, of being unaffected by its cargo, and will consequently be adapted better than the steel car for hauling slag and ashes.



Gondola railway car made of reinforced concrete

The basic feature of the design is a steel skeleton body forming the outer boundary of the car, and mounted upon a steel underframe. The concrete walls and floor are contained within this frame and, together with the frame and floor reinforcement, are connected to, and interlocked with, the underframe. The steel frame forms the finishing and protecting edges, thus entirely shielding the concrete and also serving as a complete system of stress-bearing members.

In the construction of the test car, the "cement gun" was used. The forms were placed on the outside of the car, and the cement was shot against them from within. The outside of the car, that is, the surface against the forms, was given a smooth finish, but the interior was left much as it came from the gun.

Tests of the completed car, both empty

#### Bill to Tax River Sand Killed

ST. LOUIS, MO.—A bill fixing a tax of 10 cents per ton on all sand and gravel removed from Missouri streams was rejected the week of March 3 to 9 by the Missouri Senate and House committees on swamp lands and drainage. The committees decided that the tax would drive the sand and gravel companies from the state, and, besides not bringing in much revenue, would serve to create several jobs with big salaries.

Former Judge Jesse McDonald of St. Louis, representing the St. Louis Sand and Gravel Co., opposed the measure before the committees. Much of the material is obtained from the Mississippi River, and all that would be necessary would be for the companies to move their dredges to the Illinois side of the river to escape the tax, he said.

# Preparation of Agricultural Limestone

## Kinds of Limestone and Their Value in Agriculture—Selection of Equipment for Grinding, Storing, Packing and Shipping

THE EARLIER EMPLOYMENT OF LIME compounds in agriculture consisted almost entirely of the addition of burnt (or quick) lime to the soil, although in some sections land plaster (calcium sulphate or gypsum) was used. Raw limestone was not employed to any extent until quite recently except in certain localities, notably in tidewater Virginia and New Jersey, where shell marl, which resembles ground limestone in chemical and physical characteristics, has been used for many years.

Since the introduction of ground limestone, however, the employment of this material has steadily increased. The farmers are taking kindly to it and the experiment stations are recommending it. Figs. 1 and 2 show a modern marl grinding plant, that of the Claremont Marl Co., Claremont, Va., designed and built by the writer.

### Kinds of Limestone

As most quarrymen know, there are two kinds of limestone—high calcium

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ures given here for high calcium limestone and dolomite. The table of analyses given below illustrates this.

### ANALYSES OF AGRICULTURAL GROUND LIMESTONE

Locality	Silica*	Iron Oxide & Alumina*	Calcium Oxide	Magnesium Oxide	Carbon Dioxide
Marl from Virginia.....	3.42	0.36	53.04	0.72	42.39
Buckeystown, Md.....	2.12	1.20	52.67	1.30	42.79
York, Pa. ....	0.94	0.45	53.68	1.77	42.98
Jamesville, N. Y. ....	3.02	1.96	51.44	1.46	41.87
Danbury, Conn. ....	6.30	1.78	45.89	4.61	41.06
Chester County, Pa.....	2.51	1.68	30.36	20.58	45.01
Dover Plains, N. Y.....	0.74	0.92	31.04	21.03	46.34

\*These three constituents may be regarded as impurities and of no value.

### Value For Agriculture

The value of limestone for use in agriculture depends upon the percentages

which they propose to sell their product, otherwise they may find that the recommendations of the local experiment stations discriminate strongly against their product. In this day when the farmers are taking so much interest in the scientific side of farming and are reading bulletins and attending farmers' institutes, it is by no means easy to sell fertilizers contrary to the teachings of these, particularly when the analysis is required to be printed on the bag.

### Fineness to Which Stone Should Be Ground

The fineness to which the limestone is ground is also an important factor in its value. I am inclined to believe from my own observation and study that the finer the stone is ground, the more valuable it is. It is only fair to say, however, that many high authorities contend that if the limestone is ground to all pass a 10-mesh screen (ten meshes to the linear inch or 100 to the square inch), it is fine enough, while if ground to nearly

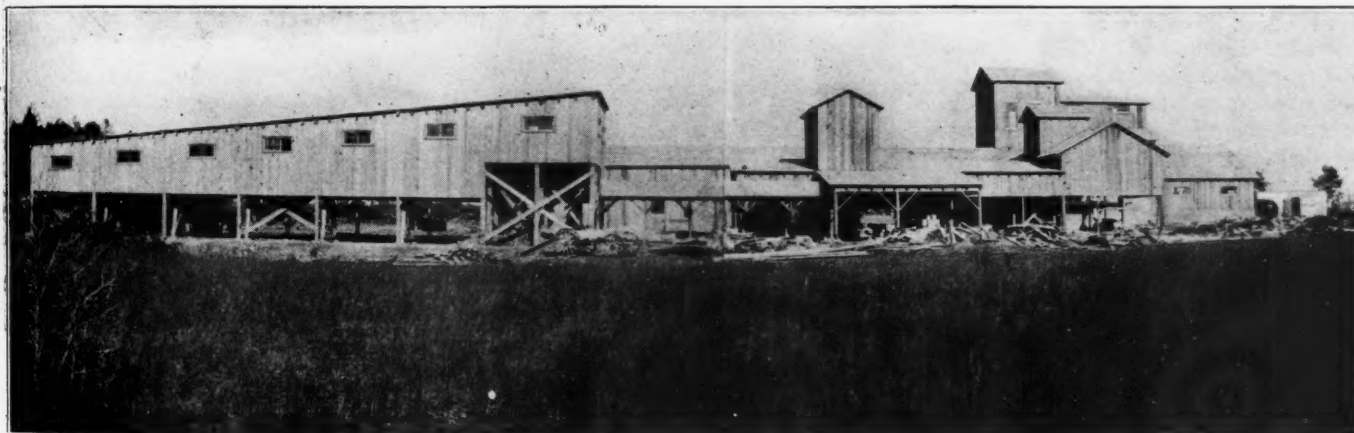


Fig. 1—Plant of the Claremont Marl Products Co., Claremont, Va.; sideview

and dolomite (or magnesium). When pure, the former contains 56% of calcium oxide (commonly called lime) and the latter 30% calcium oxide and 22% magnesium oxide (or magnesia as it is generally called). The balance in each instance is carbon dioxide (or carbonic acid gas).

Limestones are never quite pure and always contain some sand or argillaceous (clay) matter. These impurities in turn are composed chiefly of silica, iron oxide and alumina. Even the high calcium limestones usually contain some magnesia, and the dolomites do not ever contain quite 22% magnesia, so that many limestones lie in between the fig-

of calcium and magnesium oxides which it contains—the more of these present the better. Many authorities contend that only the calcium oxide is of value. For example, the state agricultural authorities in both Maryland and Virginia do not recognize magnesium oxide as being of any value and advise that high calcium limes should be employed. Prof. Cyril G. Hopkins, however, one of the pioneer advocates of ground limestone for fertilizing, contends that dolomitic limes are of equal value.

Those who are contemplating grinding limestone for the agricultural trade from dolomite, therefore, should carefully examine the requirements of the states in

all pass a 100-mesh screen, the loss of limestone from the soil by leaching makes frequent additions necessary.

They also contend that the preparation of a fine product adds considerably to the cost of the material and, since the chief aim of ground limestone is to supply a cheap form of lime, anything which adds to its cost is undesirable. Due probably largely to this latter argument, certainly much of the agricultural ground limestone offered for sale is not finer than 10-mesh product and some of it even coarser than this. The tendency of the manufacturers, however, is towards offering a finer product.



The following sieve analyses will give an idea of the relative finenesses of three grades of product:

	Coarse per cent	Medium per cent	Fine per cent
Passing Standard 10-mesh sieve..	100	100	100
Passing Standard 20-mesh sieve..	88	100	100
Passing Standard 50-mesh sieve..	70	95	99
Passing Standard 100-mesh sieve..	40	68	95
Passing Standard 200-mesh sieve..	32	55	82

#### Equipment Necessary

As I have said, the manufacture and use of agricultural ground limestone has largely increased during the past few years and while almost every limestone locality has someone engaged in its preparation, there are few good plants now in operation and much trash is also ground up and sold under the name of "agricultural ground limestone." The general idea seems to be to put in something cheap which is used to grind up cores from the lime plant or spalls from the quarry. The former are usually full of ashes and the latter of clay.

There are some producers, however, who have gone into the industry in the right way and who are trying to turn out not only as good and as pure a product as can be economically made but who have more or less efficient and well arranged plants. The success of these plants and the growth of the industry is constantly inducing other manufacturers to build good plants.

The need of this will be more apparent in time. The success of the industry will unquestionably depend on the ability of the manufacturer to furnish an acceptable article at a low price. To this end, the plant must be well arranged so that the material may be handled cheaply and the labor necessary to operate it reduced to a minimum. Since the industry is largely seasonal, storage for the product should also be provided. The problem of crushing and grinding large quantities of limestone has been well worked out in the cement and certain metallurgical industries and to these the manufacturer of agricultural ground limestone may turn for information as to the most economical methods of crushing, grinding and packing his product.

A large variety of crushers, mills, etc., are available for the production of agricultural ground limestone. Usually the preparation of this will be in two stages, (1) crushing and (2) grinding. There are mills which will take stone which has been broken down with a sledge to 6 or 8 in. and reduce this directly to 10-mesh product. These mills are, however, only suitable for very small outputs, and where a well-equipped plant is desired which will turn out any quantity of material economically or produce a fine product, the grinding can most efficiently be done in two or even more stages.

The mills which are now most used

for the preparation of ground limestone are various mills of the "hammer" type, Griffin mills, Raymond mills, Fuller-Lehigh mills and mills of the ring-roll type.

#### The Hammer Mill

Probably the most popular equipment for the preparation of agricultural ground limestone is a "hammer" mill. This type of mill owes its popularity to the fact that it will reduce the product of a crusher to material all passing a 10-mesh sieve. No driver is needed in most cases and the installation of the mill is simple.

When a hammer mill is employed, the stone is first passed through a crusher, which may be of either the jaw or gyratory type, and there reduced to pieces from 2 to 2½ in. and under. If desired, the rock may be screened and any desired size may be used, but a screen is not necessary. The crushed rock is usually elevated into a bin and fed from this to the hammer mill. A less desirable method is to feed the rock di-

rectly from the elevator leading from the crusher into the mill. In this case, it is necessary to regulate the quantity of rock fed to the mill to suit the capacity of the latter.

series of hammers which may be in the form of short flat bars or rings hinged around a central shaft. These hammers swing out as the shaft revolves and beat the material to pieces against grinding plates set around the circumference of the mill. The fully ground material falls through a grid in the bottom of the mill. The fineness is regulated by the spacing of the bars composing this grid. Fig. 3 shows a hammer mill installation in an agricultural limestone plant designed and built by the writer.

Most types of this mill produce a material nearly all of which will pass a 10-mesh sieve without any other screening than the grid. However, a finer and more uniform product can be obtained from all of them by screening and returning the tailings to the mill for re-grinding. Among screens suitable for this purpose are the "Newaygo" (Sturtevant Mills Co., Boston), the "Whip-tap" (W. S. Tyler Co., Cleveland, O.), the "Columbian" (Jeffrey Mfg. Co., Columbus, Ohio), the "National" (National En-

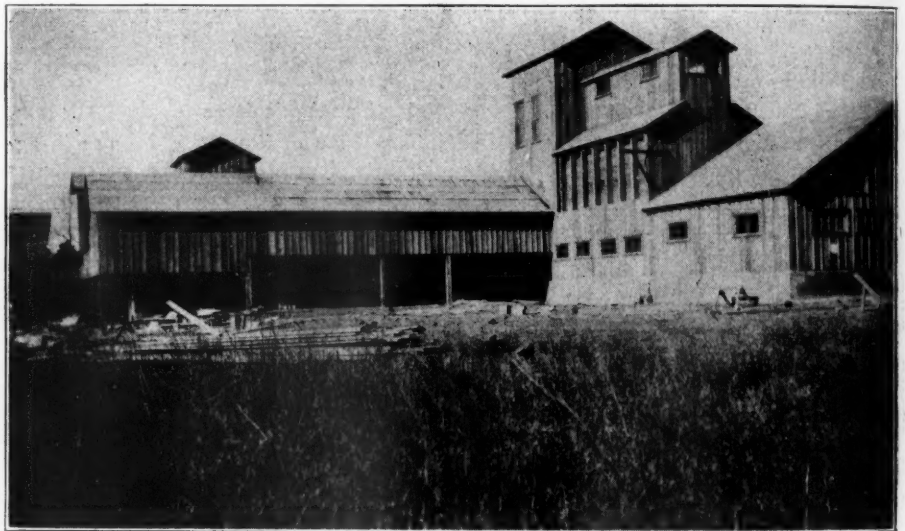


Fig. 2—Plant of the Claremont Marl Products Co., Claremont, Va.; endview

rectly from the elevator leading from the crusher into the mill. In this case, it is necessary to regulate the quantity of rock fed to the mill to suit the capacity of the latter.

The hammer mill is manufactured by a number of concerns each of whom has some particular modification of the type and among whom are the following: Allis-Chalmers Mfg. Co., Milwaukee, Wis.; American Pulverizer Co., 18th and Austin streets, St. Louis, Mo.; Greundler Patent Crusher & Pulverizer Co., St. Louis, Mo.; Jeffrey Mfg. Co., Columbus, Ohio; K. B. Pulverizer Co., 70-72 Worth street, New York; Pennsylvania Crusher Co., Philadelphia, Pa.; Universal Crusher Co., Cedar Rapids, Ia.; Williams Pat. Crusher & Pulverizer Co., 27 Van Buren Street, Chicago, Ill.

In general, these mills consist of a

gineering Co., Chicago), and the "Perfection" (Kent Mill Co., Brooklyn). When a screen is used this can generally be located most conveniently above the packing bin and the tailings spouted back to the mill.

The hammer mill is well suited to grinding a product which will all pass a 10-mesh screen but is not adapted to giving a material much finer than 50% passing a 100-mesh sieve. The principal advantages of the hammer mill are that it may be fed with coarse rock and will in one operation reduce this to a finished product, and that it does not require the rock to be previously dried.

#### The Griffin and Bradley Mills

These mills are manufactured by the Bradley Pulverizer Co., Allentown, Pa. The type usually employed for preparing ground limestone is the three-roll Brad-



ley mill, although where small outputs are desired a single-roll Griffin mill may be used to advantage. The three-roll Bradley mill consists of three rolls suspended from the cross yoke of a central vertical shaft. This latter is hung from an "A" frame and is revolved by means of a horizontal pulley. When the shaft revolves, these rolls swing out against a horizontal ring or die and the material is ground in between this ring and the rolls.

When ground it is sucked up by fans attached to the shaft and blown through a screen into a chamber between this screen and the other casing of the mill, after which it falls down into a chamber below the mill foundation. From this it is conveyed by suitable means. The fineness of the product depends on the size of screen employed, and a product of any fineness from one of 95% passing the 100-mesh screen down to coarse material can be obtained by changing the screen and rate of feed. This mill is self-contained and no outside screens are

#### The Fuller-Lehigh Mill

The Fuller-Lehigh mill, manufactured by the Fuller-Lehigh Co., Catasauqua, Pa., consists of a die or ring mounted on a suitable casting, against which four balls are made to revolve by means of pushers which are fastened to a central shaft. The material is ground between the balls and die. The ground material, as in the case of the Griffin mill, is sucked up by means of fans and blown out through screens into a chamber between these and the casing, from which it is discharged by a sweep.

The Fuller-Lehigh mill may be obtained in a number of sizes and almost any fineness of product desired may be obtained by altering the screens. The material fed to the mill must be first crushed to about  $\frac{3}{4}$ -in. and under, depending on the size of the mill—the larger mills taking coarser feed than the smaller ones.

The most popular sizes of Fuller-Lehigh mills employed in the ground lime-

dust collector, where the fine powder settles out and is discharged from the bottom.

The fineness is regulated by the draft of air through the separator. The Raymond mill also requires the material to be crushed to  $\frac{3}{4}$ -in. and under before being fed to it. This mill is well adapted to giving a fine product but can not be made to give a material coarser than about 80% passing the 100-mesh screen. A 4-roll mill requires about 60 h. p. and will pulverize from 4 to 6 tons of fine material per hour.

#### The Ring-Roll Mill

The ring-roll mill is made in two types "Kent" and "Sturtevant." The first is made by the Kent Mill Co., 170 Broadway, New York, and the latter by the Sturtevant Mill Co., Boston, Mass. In both types there is a vertical ring and three rolls which are pressed against the inside surface of this by springs. In the Kent mill, the rolls revolve around three fixed axes and drive the ring also, so that this latter revolves too; while in the Sturtevant, the ring is stationary and the rolls not only revolve around their own axes, but also around the axes of the ring. The grinding is, of course, done between the rolls and ring.

These mills do not discharge a finished product but are used in connection with some form of screen, the tailings from the latter being returned to the mill. With the Kent mill a "Perfection" screen is supplied and with the Sturtevant mill a "Newaygo" screen is furnished. These mills also require the material to be crushed to 1-in. and under before being fed to them and are better adapted to coarse and medium than to fine grinding. This type of mill usually requires from 25 to 30 h. p. and has a capacity of from 3 tons of fine product to 6 tons of coarse material per hour.

#### The Tube Mill

The tube mill is also employed to a limited extent for the preparation of agricultural ground limestone. It is not so well adapted for this purpose as the mills mentioned above, however, for the reason that it must be preceded by some form of coarse grinder, such as one of the foregoing mills or by a ball mill and also that the material to be pulverized must be perfectly dry (or else very wet). The tube mill is essentially a fine pulverizer and is therefore not so well adapted to producing economically material of only medium fineness. The large space required for the installation of the mill, the need of a preliminary grinder and dryer and the fact that it requires more power per ton in grinding than the other types all limit its employment to plants specializing in a fine ground product.

#### Effect of Moisture

It is not usual to dry the rock before

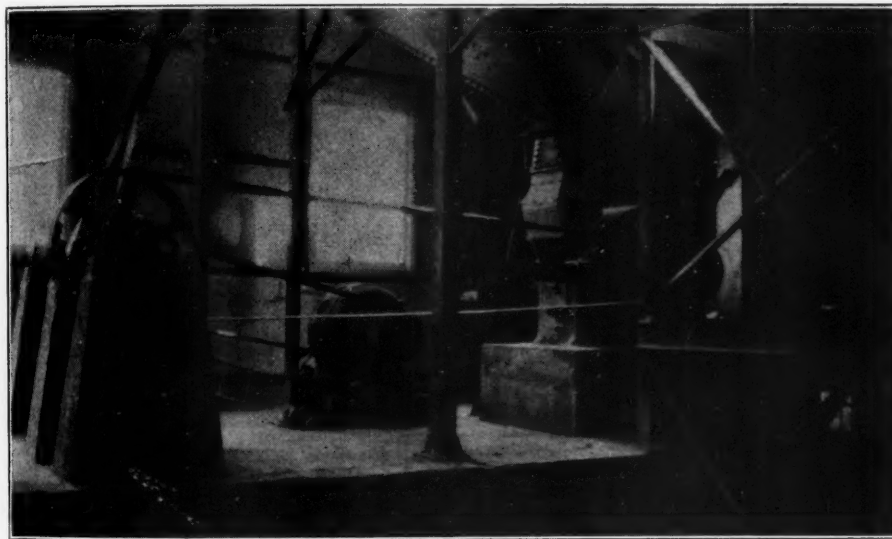


Fig. 3—Hammer mill installation for grinding agricultural limestone

needed when a fine product is desired. A three-roll Bradley mill requires from 35 to 40 h. p. to operate and will pulverize about 3 to 4 tons of limestone to 100-mesh product or 8 to 10 tons of coarser material per hour, depending on the hardness of the rock, fineness of product desired, etc.

The single-roll Griffin and ordinary three-roll Bradley mills require that the stone shall be reduced to approximately  $\frac{3}{4}$ -in. stone and under. There is a big three-roll Bradley mill called the "Hercules" which will take larger material and reduce this to a product of which 55% will pass the 100-mesh screen, but the output of this mill is probably far in excess of that needed by the quarryman, being about 40 tons per hour. It is also not intended for fine grinding.

stone industry are the 33-in. and the 42-in. mills. The former requires from 25 to 30 h. p. and has a capacity of 2 to 3 tons of fine material per hour. The larger mill requires from 50 to 60 h. p. and has a capacity of from 4 to 6 tons of fine material per hour. The output is of course greatly increased when the material is ground coarse.

#### The Raymond Mill

The Raymond mill is manufactured by the Raymond Bros. Impact Pulverizer Co., Chicago, and consists of four or five rolls which are suspended from cross arms fastened to a central vertical shaft. When the shaft revolves, these rolls are swung out against a ring or die and the material is ground in between the die and rolls. The finely ground powder is sucked up through a separator, by means of an exhaustor and blown into a cyclone

pulverizing in the preparation of agricultural ground limestone, nor is this necessary or desirable unless a very fine product is required. Hammer mills and Raymond mills are less influenced by moisture than the screens mills. No difficulty will be experienced grinding most limestone rock without drying to a fineness of 10- or 20-mesh product with any of these mills, however, provided the rock is not actually wet and is free from clay.

(Dryers, however, have been found necessary in many instances where it was desired to continue operations in rainy weather.—The Editor.)

Even with damp rock if the fine material and clay is first screened out and only the coarse  $\frac{1}{2}$  to 1-in. material is fed to the mill, very little difficulty will be experienced when grinding to the above fineness. If a fine product is desired, however, that is one in which 90 to 95% will pass a 100-mesh screen, the hammer mills can not of course be used and the screens of those types which employ these, either inside or outside of the mill, are apt to become clogged with damp material. The Raymond roller mill is less likely to be influenced by moisture than any of the other types of fine grinder. But even this mill will work much better on a dry material than on a damp one. When the output warrants the expenditure and a fine product is desired the installation of a dryer will pay.

For drying limestone, nothing is better than a direct fired rotary dryer. This consists of an inclined revolving cylinder heated by a grate fire at one end, the rock being fed in at the other. A 4-ft. diameter by 30 to 40-ft. long dryer will reduce from 10 to 15 tons of rock per hour from 5% moisture to  $\frac{1}{2}$ % and a 5x50-ft. one will dry 20 to 25 tons under the same conditions.

A number of concerns are now preparing marl for agriculture. As this material when dug contains from 20-30% of water it should first be dried. This is done in dryers of the type described above.

#### Selection of Equipment

In a large quarry crushing limestone for flux or lime burning, where the general run of stone is pure enough to sell for agricultural purposes and where the stone which would be pulverized is only a small part of that crushed by the concern, the installation necessary for grinding limestone is quite simple. In such a quarry it would usually consist, in addition to the crushers and screens already installed for crushing the stone, of only a pulverizer. Great latitude would also be allowed in the choice of the latter.

As but a part of the stone is to be ground, only the smaller sizes of the crushed stone need be used and consequently a Bradley, Griffin or Fuller-Lehigh mill could be employed and fed with

only that portion of the stone passing the  $\frac{3}{4}$ -in. screen. These mills, as I have said, have the advantage over those of the hammer mill type in that they may be made to give a fine product as well as a coarse one. If only a fine product is desired a Raymond mill would also answer well.

It is well to bear in mind that the fine product is in some demand for other purposes than agricultural, as for example, asphalt filler, for automobile tires, for neutralizing acid, etc. Then too, while the coarser ground material is now acceptable in most states, the general tendency is towards a finer product and it would be well to make provision to meet the demand when it occurs. The pulverizers do not require appreciably more power when grinding to the same degree of coarseness than do the hammer mills, nor are the repairs any greater, but their first cost is somewhat higher.

When it is desired to furnish only agricultural ground limestone, the installa-

product of a gyratory to the size feed necessary for a pulverizer, the following mills are all very acceptable.

Rolls (made by most manufacturers of crushing equipment); Hammer mill provided with coarse grids to give a  $\frac{1}{2}$ -in. to  $\frac{3}{4}$ -in. product; Symons disc crusher (Chalmers & Williams, Chicago Heights, Ill.); "Pot" cracker (Butterworth & Lowe, Grand Rapids, Mich.); Sturtevant open-door crusher (Sturtevant Mill Co., Boston, Mass.).

Of these, the first three are well adapted to large outputs and hard stone. The last two furnish fairly satisfactory equipment for small outputs and soft stone. The Williams Pat. Crusher & Pulverizer Co., has recently put out a hammer mill which is made in both small and large sizes and which will reduce from 16-in. pieces to  $\frac{3}{4}$ -in. product. The Symons disc crusher is also made in small sizes. Rolls are not well adapted to anything but very large plants because the diameter of the rolls is not determined by the output desired but

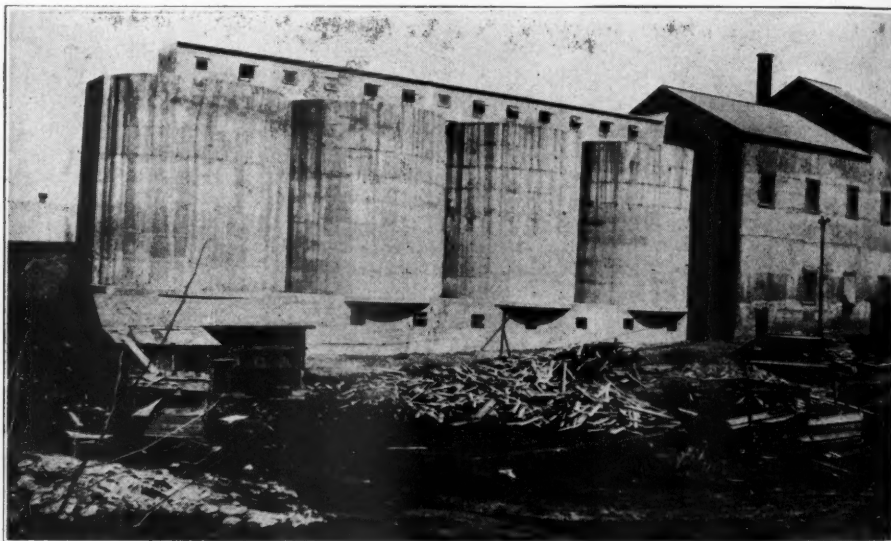


Fig. 4—Reinforced concrete lime storage

tion will depend entirely on the fineness of product desired. If the product from the hammer mill is fine enough, this mill alone may be employed, but if a fine product is desired one of the pulverizers should be employed preceeding this by some apparatus which will reduce the product of a gyratory crusher to the proper size for the pulverizer (about  $\frac{3}{4}$ -in.). Where the rock is soft and the output desired is small, a gyratory or jaw crusher may be dispensed with and a Sturtevant open-door or roll-jaw crusher may be used to advantage, as these will take rock sledged to 6 or 8 in. and reduce to the proper size to feed to the pulverizer. In one of our plants we have used the combination of Sturtevant crusher and Fuller mill to advantage for pulverizing soft dolomite.

#### Intermediate Crushers

For reducing the limestone from the

by the size of the rock fed to them, and the size roll necessary to take the product of a gyratory has large capacity and is expensive. Installations of rolls are generally unsatisfactory because a set too small for the feed is selected.

For a fairly large installation, designed to prepare only agricultural ground limestone, we usually suggest a gyratory crusher followed by a small hammer mill and this in turn by a three-roll Bradley, a Griffin or a Fuller mill. This installation will give any fineness of product desired. The hammer mill may be fed directly from the crushers but the pulverizers should be fed from an overhead bin.

#### Storage, Packing and Shipping

Pulverized limestone is shipped in bulk and in bags. If the former, the product from the pulverizer is elevated



by means of a bucket elevator and spouted directly into the car. It will be found of advantage to pass the material through a pair of automatic scales provided with a counter and thence into the car. This will allow the weight to be taken accurately without recourse to track scales, etc. For packing in bags, a packing bin should be provided. The same elevator used for bulk shipments can be arranged to carry the limestone to this bin and the same pair of automatic scales may also be made to record the limestone ground into the bin.

In some few plants, a large storage is provided for ground limestone. This usually consists of a long narrow building with sides properly constructed to withstand the pressure so as to form a big bin. A screw or belt conveyor in the roof of the building brings in the ground limestone, while one in the floor, or in a tunnel under the floor, carries it out. Usually the elevator which carries the product from the pulverizer to the packing bin is so arranged that it will also discharge into either the screw conveyor leading into the storage or into the bin so that material may be either stored or packed as ground.

An excellent storage for agricultural ground limestone would consist of a series of reinforced-concrete silos, such as are now extensively used for cement and grain. Such a storage is shown in Fig. 4. These give cheap storage and the product may be gotten out of them with a minimum amount of labor. A ton of ground limestone in bulk requires about 22 cu. ft. of storage space.

In the majority of plants, no storage is provided, however, and the limestone is packed and shipped as ground. As the agricultural limestone business is a seasonal one, storage will allow a more continuous operation of the plant and will always prove a good investment.

Numerous automatic sacking machines have been tried for packing ground limestone. A common method is to use a spout leading from the packing bin and closed with a slide or a butterfly valve. The sacks rest on a platform scale under the spout and the slide is opened until the approximate weight is obtained, the amount being finally adjusted by means of a scoop. The ordinary sack packer of the type used in flour or grain mills will also be found successful.

The farmer should be educated to use limestone in bulk, however, and this may be safely shipped in this manner no matter how finely it is ground. To ship in bulk the two ends of the car are boarded off by means of 2-in. planks (a 1-in. plank properly braced may also be used) running across the car on each side of the door to a height of 3 ft. The floor and sides of the car after knocking

out all nails, etc., should then be covered with light building paper.

Ground limestone when not sold in bulk is usually shipped in paper or old burlap bags. The paper bags are made to hold 100 lbs. but the burlap bags vary in size and are usually purchased second hand—old salt, coffee, potash, etc., bags being used. A large burlap salt bag will hold comparatively from 150 to 175 lbs. of ground limestone and if 167 lbs. are placed in each sack, twelve are required for a ton of limestone. Enough bags to pack a ton of product usually cost from 75 cents to \$1.50, depending on the market and whether paper or burlap bags are used. Just now both paper and burlap are very high. Generally the burlap bags are repurchased from the farmer, if returned in good condition, at the same price as sold to him.

#### Legal Requirements

Practically all states have certain laws regarding the sale of fertilizers under which head ground limestone is classed. Usually these laws require the registering with the state agricultural department of the name of the brand, the name and address of the maker, his guarantee as to the percentage of calcium carbonate (or in some states calcium and magnesium carbonate) which his product will contain and the fineness to which it is ground. Fees are usually required for registering.

These acts also require that the bags in which the product is sold shall have printed on them the above information and also the weight of material in each. Or else a tag may be attached to the bag stating these facts. The latter plan is usually followed with second hand burlap bags and the former with paper bags. If the limestone is sold in bulk, there must be a placard tacked in the car giving this information. These laws require not only the local manufacturer to register his brand and follow these rules, but prescribe this for all who sell lime within the state.

Thus a manufacturer of ground limestone in Maryland would be required to register, not only in Maryland, but also if he sold his product in these states, in Virginia, Pennsylvania and West Virginia. Penalties are usually imposed on a manufacturer for selling lime in states without registering his brand or properly marking his packages, etc. Some states require that if the lime does not meet the guarantee as to quality the manufacturer must pay a fine to the state and some a penalty to the purchaser.

The process of registering is simple, blanks being furnished by the agricultural departments of the various states for this purpose. The fees must be paid each year but are small, usually \$10 or \$15. An occasional analysis costing \$2 to \$8 will be sufficient to ascertain that

the product meets the guarantee as to purity and fineness.

#### Cost of Pulverizing Limestone

The cost of pulverizing limestone will depend very largely on local conditions. The power requirements for a hammer mill working on 2-in. material and reducing the same to 10-mesh product will be from 6 to 8 h. p. hours per ton of material ground. A pulverizer given stone broken down to  $\frac{3}{4}$ -in. and under and pulverizing to 90% passing the No. 100 sieve will require about 12 to 15 h. p. hours per ton of output. To reduce the stone from 2 to  $\frac{3}{4}$ -in. will require  $2\frac{2}{3}$  h. p. hours per ton. A gyratory or jaw crusher will require about 1 h. p. hour per ton of stone crushed to 2-in. material. The total power requirements per ton of product are therefore from 7 to 9 h. p. hours, for coarse product, to 15 to 20 h. p. hours, for fine material. The supplies and repairs vary from about 2 cents per ton for coarsely ground material to 5 cents per ton for the fine.

The labor required depends entirely on the size of the plant and the efficiency of the labor. One man will be required to attend to the pulverizing mills and three men should pack in bags and load on the cars from 100 to 150 tons of material per day. For shipments in bulk with proper facilities for loading, one man is required to prepare the car, trim the pile, etc., for the above quantity.

The cost of quarrying varies greatly in different localities and depends very much on how the stone lays, how it drills, if it breaks up on blasting and the labor required to sledge it to a size where it may be handled conveniently. When stone has to be selected and certain ledges or veins picked out and certain discarded the cost of loading is greatly increased. The amount of stripping to be removed and waste to be carted away also bears on the cost of stone. Quarrying with hand loading now seldom costs less than 40 cents per ton and often two or three times this. The items entering into the cost of preparing pulverized limestone will comprise: (1) Quarrying the stone; (2) Power for crushing and pulverizing; (3) Labor; (4) Repairs and supplies.

The industry has passed beyond the experimental stages and the demand is now permanent and increasing so that the manufacturer can well afford to build for the future. To this end, he will be well repaid by selecting the best and most serviceable machinery, installing this substantially and with due regard to the conveying of the material from one unit to the next, and housing it in permanent buildings of steel or reinforced concrete. He should also provide proper storage facilities for enough product to keep his plant operating during the dull season and to provide a surplus upon which to draw when necessary.



# Railway Cooperation Increases Use of Limestone 1,000 Per Cent

**Agricultural and Industrial Agent of Chesapeake & Ohio R. R. Takes a Hand in Promotion—Establishes Lime Depositories—What Other Railways Are Doing**

**A**T LEAST FIVE railways are actively engaged in promoting the use of agricultural lime and limestone along their lines. Why? Because broad-gauge railway men still believe in building up their tributary territory in every possible way. And how can you better build up an agricultural territory than by increasing the use of agricultural lime and limestone? Maybe other railways will help you, Mr. Producer, if you go about it in a constructive, cooperative frame of mind.

One railway which is already helping the cause is the Chesapeake & Ohio R. R., of which K. T. Crawley is agricultural and industrial agent. Mr. Crawley describes his work as follows: "My plan is briefly this: By engagements I meet the Farmers' Unions at the various stations in sections where I know the soil needs lime. I presume we have had 25 or 30 such meetings.

## Farmers Pay for Storage Bins

"I set forth at once the difficulties that have stood in the way of securing lime and limestone and then propose as a remedy the construction of a lime bin or depository, which means a house usually about 16 x 30 ft., conveniently located, in which may be stored from 3 to 5 carloads of ground limestone or agricultural lime. I convince the farmers that this building may be put up for not over \$300, and as soon as they see the convenience of it, almost at once the amount is subscribed. In some cases we find a suitable house already built at the station which may be utilized, and in some instances I have been able to lease the farmers a location on our right-of-way on some spur track.

"So far we have established about 30 such depositories. The farmers arrange to put some one in charge, who receives the lime and distributes it at a cost of about 50c per ton above the price of the material. I obtain a list of all the farmers in the surrounding country and to each farmer I write a personal letter setting forth the great necessity of their using lime, telling them also how easily it can be secured at any time, from an agent who is well known to them, at their local station and at a very reasonable price.

## Increases Use of Limestone 1,000 Per Cent

"It now looks as if the use of lime-

stone in this section will be increased 1,000 per cent this year."

The railway company takes no responsibility for either the purchase or storage of the material. It merely takes the initiative in helping the farmers themselves to purchase and distribute the lime. Mr. Crawley states that he and his assistants of course give every possible help even to suggestions and advice on advantageous ways and means for constructing the bins or depositories.

Mr. Crawley, whose address is care Chesapeake & Ohio R. R., Richmond, Va., states that he would like to get in touch with producers of lime and agricultural limestone in the territory served by his railway, and asks that they correspond with him. He also states that he would be especially pleased to meet any of their representatives and go into the proposition in more detail.

## What Other Railways Are Doing

The Norfolk & Western R. R., of which T. Gilbert Wood is agricultural agent (Roanoke, Va.), was directly responsible for placing orders for 68 car loads of agricultural lime during the month of September, 1918. A four-page livestock bulletin issued by this railway on March 1, 1919, had resulted in placing orders for 62 car loads of agricultural lime by March 17. The arguments which sold this lime were these:

### LIME FOR THE SOIL

"To get the greatest good out of manure or fertilizers you must have lime in the soil."—Dr. Thorne.

The application of lime on most lands and for most crops will increase the yield and improve the quality. Liming the soil has been widely tested and approved by experiment stations and agricultural colleges.

1. Lime corrects the acidity of the soil.
2. Lime improves the texture of soils and makes them more tillable.
3. Lime decomposes potash compounds and makes them more readily available.
4. Lime assists in the conversion of organic matter into available humus.
5. Lime aids the desirable fermentation processes.
6. Lime forms compounds with various chemicals necessary to plant growth and prevents their loss by leaching or filtering especially in sandy soil.
7. Lime makes sandy soils more cohesive and retentive of moisture.
8. Lime makes clay soils more porous and granular.
9. Lime promotes the nitrification of soil through the colonies of bacteria on leguminous plants.
10. Lime provides a favorable condition for beneficial action of soil bacteria.

11. Lime produces the sanitary conditions that prevent the growth of injurious bacteria.

12. Lime removes and overcomes the accumulation of poisons that are formed by decay of humus and excretions from plant roots.

13. Lime is a plant food and is necessary to the growth of plants.

14. Lime releases and makes stored up plant food usable.

15. Lime assists in restoring land to its high yielding power and original productiveness.

16. Lime is a corrector, a dissolver, a decomposer, a liberator of certain parts of animal, vegetable and mineral substances contained in the soil, and it is a fertility maintainer.

17. Lime insures increased production, more wealth and a more permanent agriculture. For further information relative to the uses and sources of lime apply to your County Demonstration Agent, or to

T. GILBERT WOOD,  
Agricultural Agent,  
Norfolk and Western Railroad,  
Roanoke, Virginia.

Mr. Wood states that lime and limestone depositories are being established at favorable points along the Norfolk & Western R. R. Agricultural representatives of this railway are graduates of agricultural colleges. They appear at farmers' institutes and give advice and assistance on all agricultural problems of the farmer.

## Middle West Railroads Help

The Chicago & Eastern Illinois and the Evansville & Indianapolis railroads, of which E. S. Stephens is agricultural agent (Chicago, Ill.), have been advocating the use of agricultural limestone for some time. Mr. Stephens states that he is endeavoring to have people along the line handle the material at practically cost, as he considers 50c per ton too much profit, particularly at the present time.

The Pere Marquette R. R. through membership in the Michigan Agricultural Development Association is helping to promote the use of agricultural limestone. The New York Central Lines, W. C. Byers, agricultural agent (Chicago, Ill.), for a number of years has been promoting the use of limestone in the territory served by this railway with a great deal of success, writes Mr. Byers. He says further that the railway company has been leasing small plots of ground to farmers at some of their stations for the storage of ground limestone.

Mr. Byers writes that he "found in the recent season of car shortage that this was desirable from the standpoint of

keeping the cars moving as fast as possible. The farmers likewise found it advantageous in that upon receipt of shipment it could be unloaded within the usual free time and later hauled to their farms for distribution at their convenience. Our lease for such plots calls for a very nominal price, sometimes it is given free. This, however, depends upon the value of the property and the nature of the facilities, but in no case does it exceed a few dollars a year. Our usual lease is given to an association of farmers, preferably the Farm Bureaus, or some organization allied with the Farm Bureau, although in some cases we have leased such plots to dealers or individual farmers."

The Chicago, Burlington & Quincy R. R., of which J. B. Lamson is agriculturist (Chicago, Ill.), has always encouraged the use of ground limestone on the corn belt soils. Mr. Lamson writes that "in many sections it is impossible to secure a stand of alfalfa or clover without first applying agricultural limestone."

"In regard to providing bins and sheds for depositing limestone at convenient points, along the right-of-way," Mr. Lamson writes, "we have always furnished space for such depositories whenever requested by farmers. Whenever speaking at farmers' meetings in our corn belt country, we have always emphasized the importance of using limestone."

The agricultural agents of numerous other railways have expressed much interest in this work.

#### Fine Field for Cooperation

Needless to say, every producer of agricultural lime should take advantage of this opportunity. There is probably no more effective plan that can be hit upon for promoting the use of agricultural lime and limestone. The cooperation of the producer, the carrier and the farmer is ideal, and when, as in this case, the result is of such obvious benefit to all three parties and to the whole nation as well, it should be promoted rapidly and widely.

It is particularly gratifying to have the railway officials take a hand in personally writing to the farmers of the merits of agricultural lime and limestone. While the national and state agricultural authorities are constantly urging the use of lime and limestone, the brief pointed letter of the railway man not only urging the use of lime and limestone, but telling the farmer how easily it can be obtained, is undoubtedly the clincher in the sale of a vast amount of material.

#### Local "Pulver" Competition in Indiana Serious

AS A RESULT of the activity of County Agent Clarke A. Richards, of Jennings County, 45 limestone crush-

## Ground Gypsum Supplies Sulphur

### No Conflict Between Use of Limestone and Gypsum—Another Rock-Products Fertilizer About to Come to Its Own

EVERY PRODUCER of agricultural lime and limestone should be interested in the campaign begun by the Gypsum Industries Association to develop the use of ground raw gypsum rock as a fertilizer. Gypsum is calcium sulphate; limestone is calcium carbonate. There exists not the least cause for rivalry between these two.

Gypsum has little power to neutralize acid soils. Limestone has no sulphur to supply the soil with. The calcium element of both is a minor factor in the purposes they respectively serve. Every reason exists for the closest cooperation between the producers of these two materials. They can work together to convince the farmers that nature's rocks can often supply all their needs for fertilizers without the help of the packing-house interests and "commercial fertilizers," which sometimes are more "commercial" than "agricultural."

Research Bulletin No. 14, University of Wisconsin, Agricultural Experiment Station, on "Sulphur Requirements of Farm Crops in Relation to the Soil and Air Supply," says in part:

"It is a well known fact that the wool of the sheep is of a protein nature. This protein, keratin, belongs to the class of proteins known as albuminoids and is rich in sulphur, containing about two per cent in the air dried condition. Besides the sulphur in organic combination in the pure wool fiber, there is a certain amount of sulphur in other forms in the crude wool.

"In one hundred pounds of crude wool there may be, approximately, two pounds of total sulphur. This considerable amount of sulphur necessary for building the sheep's fleece has raised the problem of the relative amounts and forms of this element in our common feeding materials and the efficiency of such forms for wool production.

"It is generally recognized today by agricultural chemists that the amount of sulphur in plant materials, as determined

in the ash, is in most cases entirely too low; that in the process of ashing, sulphur is lost and the residual amount found in the ash may represent but a fraction of that originally present in the plant tissue. For that reason it is unfortunate that writers should speak of the sulphur in the ash."

The Bulletin then gives a long list of feeding materials and shows the relatively high percentage of sulphur and sulphur trioxide recovered.

"The very important fact which the above data furnishes is that farm crops remove much more sulphur from the soil than has been supposed.

"No one questions the absolute necessity of sulphur for plant growth. It is necessary for the production of plant proteins and all the plant proteins that have been investigated contain sulphur. Only one class of proteins is known to be free from sulphur and that is the class of protamines of animal origin, which, however, have not as yet been isolated from plant tissue.

"The imperative necessity for maintaining an ample supply of this element for plant production is as important as maintaining a supply of phosphorus, nitrogen or any of the other elements essential for plant development. The apparent reason why so little attention has been given to this element in the schemes of fertilization for plant production has been due to the fact that it was believed that crops removed but little from the soil and consequently the supply was ample for continuous production.

"Sulphur can be added to the soil either as land plaster; with acid-phosphate, in which it exists as calcium sulphate; or as a sulphate of potassium or ammonium. All these materials are now offered by the trade. A ton of land plaster contains about 900 pounds of sulphur trioxide and a ton of acid-phosphate will carry from 200 to 300 pounds of sulphur trioxide, in addition to the phosphorus pentoxide it contains."

The Kentucky Experiment Station, Bulletin No. 174, says: "There is not sufficient sulphur in the soil or supplied by rain for heavy yielding crops, rich in albuminoid, either for the production of the greatest yield or the highest feeding value, and for such crops a sulphate should be included in the artificial manure. Ordinary farm crops remove nearly as much sulphur as phosphorus and perhaps more in proportion to the amount contained in the soils. In some crops, such as cabbage, turnips, alfalfa, etc., considerably more sulphur than phosphorus is taken from the soil."

ers have been placed in that county within the last year, and the vast deposits of limestone there are being ground and spread over the land to correct acid soil. More than 50,000 tons of crushed stone have been used on the farms there, which will result in a great increase in crop production and much larger profits for the farmers who have used it. Liming work is being made a major project by better farming associations and farmers' organizations in many counties of Indiana.



# Lump Lime, Hydrate or Limestone?

The Real Argument for Finely Ground Material—Also the Reason for Using Lime and Hydrate

IN DISCUSSING "How finely should limestone be crushed?" W. W. Weir, of the agricultural department of the University of Wisconsin, writes in the March 1 issue of the "American Fertilizer" as follows:

"When the lime is added to a soil, the chemical changes which necessarily occur when the soil changes from acid to not acid do not take place suddenly and completely, but more or less slowly, depending upon several factors. It is generally recognized that alfalfa or clover does best when soil is not acid. It follows, therefore, the quicker the soil acidity is destroyed the better the results in growing these important legumes. When alfalfa or clover is to be grown upon a certain field and the soil is acid, it is best to lime that field at least a year in advance to enable the lime to act, so that the soil conditions would be more favorable for the legume when it is sown.

"It is not always convenient to lime a field a year or two in advance of sowing the alfalfa; so that it often becomes necessary to do the liming a short time before the alfalfa is sown. Since the alfalfa does best in soils not acid it is important to consider, under such conditions, the reduction of the acidity in the quickest possible manner.

"To accomplish this, three things should be carefully considered, namely:

"(a) A finely pulverized material should be used.

"(b) A material high in carbonates (or lime) should be used.

"(c) The material should be thoroughly mixed into the soil.

"This brings up the question of the comparative value of coarsely crushed and finely pulverized limestone.

## Effective Lime Content Is What Counts

"It should be remembered that it is the fine material in pulverized limestone that is effective in causing quick action. Material that is too coarse to pass through a 40-mesh screen (screen having openings 1-40 of an inch in diameter) is not considered of much value in bringing about this quick action. The effectiveness of any pulverized limestone may be indicated by the per cent of material it contains that will pass through a 60-mesh screen.

"One ton of the coarse material will contain 640 pounds of effective material, while in a ton of the finely pulverized limestone there will be 1,100 pounds of effective material. The freight rate per

ton will be the same on the two grades of limestone. Let us assume a freight charge of \$1 per ton laid down at a certain point. The effective material in the high-grade limestone will cost the farmer 27 cents per hundred pounds laid down at his station, and that in the coarse grade 37.5 cents, or about 40 per cent. more.

"Unless a farmer can secure coarsely crushed limestone very cheaply, and the haul is short, it would be wise economy to consider the purchase of high-grade, finely pulverized limestone for use in liming land, especially for the first time, since in this way the effective neutralizing material can be purchased more cheaply and quicker and better results can be secured when more fine material is added to the soil for every ton of limestone applied."

## Carry the Argument Further and Lime Should Be Used

The same argument carried to its logical conclusion gives the reason why hydrated lime or lump lime is often the most economical material to use. Lump lime has about twice the effective lime content of the carbonate (stone), while hydrate is the most finely pulverized form of lime possible to obtain, and deducting for its moisture content, it has 75 per cent at least of the effectiveness of lump lime.

Thus it is only a question of economics which material to use, lime, hydrate, finely pulverized stone, or coarsely ground stone. In many parts of the East where limestone deposits are somewhat scarce and limestone pulverizing plants still scarcer, and where freight rates are high, lime and hydrate are mostly used, while in the Central West where limestone is everywhere and freight rates relatively low the material most used is pulverized stone and in a great many instances screenings.

It is not necessary, therefore for every farmer to figure out his own individual problem, because the locality and general conditions are the determining factors. There will always be a field for all three kinds of "agricultural lime," but it is obvious that burnt lime and hydrate will never be able to supplant ground limestone to any large extent in the Central West territory. Statistics of production for the last six years show that burnt lime and hydrated lime for agricultural purposes are just holding their own, while pulverized limestone has increased in use by over 500 per cent.

In the face of this evidence Central West and many Eastern lime producers are promoting the use of ground limestone with equal interest to their agricultural lime trade. It is the only safe course for a lime manufacturer to take in view of the ample evidence that enough ground limestone, finely ground, will produce practically the same results, although in a longer time, as either lime or hydrate.

## Send Him Your Letter of Appreciation, Too!

FORMER GOV. H. C. STUART, of Virginia, chairman of the National Agricultural Advisory Committee, which was organized a year ago to work with the United States Department of Agriculture and the United States Food Administration, has ended his active duties as chairman of the committee and closed the committee office in the Department of Agriculture. In a letter to Gov. Stuart the Secretary of Agriculture, D. F. Houston, says:

"I have your letter calling my attention to the fact that the functions of the National Agricultural Advisory Committee, as related to the Food Administration, would probably terminate on March 1; that you desired to be relieved, as chairman of the committee, from further active duty; and that, subject to my approval, you were fixing March 8 as the date for vacating the offices now occupied by you.

"The acute conditions which led to the creation of the committee have passed, and I therefore do not feel justified in asking you or the other members of the committee to assume further obligations or responsibilities. I know that each member of the committee has matters of importance requiring persistent attention and should not be called upon to make further sacrifices unless the public welfare demands it.

"I desire to express, through you, to all the members of the committee, my grateful appreciation of their response to the call for service made by the Food Administrator and myself. The committee rendered valuable assistance to this department and to the Nation during the trying experiences with which we were confronted and was a constant aid and comfort."

This is the committee which put agricultural lime and limestone on the war map. It deserves the sincere thanks of every operator in the industry.



# Things Which Have Handicapped the Promotion of Agricultural Lime

Producers Not Always Pursuing Right Methods for Developing Maximum Demand

IT HAS BEEN WELL established, that lime in one form or another is necessary for normal crop production in approximately all parts of the country, more particularly east of the Mississippi, and that the quantity in the aggregate necessary to bring the land up to normal production is far above the production of lime for all purposes and yet the manufacturer struggles to sell lime and the agricultural colleges and experiment stations struggle with the problem of increasing the use of lime on farms. There are a number of exceptions to this rule depending somewhat on the character of the soil and upon the character of the farming, but I shall not go into detail regarding these cases.

Take for example conditions in New York State which are perhaps representative of agricultural conditions pretty much everywhere. The fact has been well established that the use of 2,000 lbs. of ground limestone, 1,400 lbs. hydrated lime or 1,000 lbs. of burned lime will increase the clover crop and the timothy crop ordinarily following it in the proportion of 2 to 1. It has also been determined that a good clover crop will create conditions in the soil favorable to the production of all other crops in a general rotation. Therefore, the farm bureau agents and members of the faculty of the College of Agriculture are constantly teaching the underlying principles and the facts regarding the use of lime—endeavoring to induce farmers to improve the clover crop in this manner. This work is more vigorous than any other line of work conducted and affects all lines of agriculture materially. It would be possible to give other examples of the advantages derived from the use of lime, but this one meets the most prevalent condition.

## Clover or Alfalfa as a Criterion?

Crystallizing attention on the clover crop is, in a way, setting a standard of fertility. It is doubtful whether this standard of fertility is as high as is best for the farmers, and it is possible that successful alfalfa growing should be made the standard and thus give the farmer something toward which to climb, making the ladder a little bit harder and a little bit steeper; in reality it would be putting a greater goal before them.

Such a procedure would be a remarkable asset to the lime industry because

By John H. Voorhees  
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clover, more particularly the variety known as Alsike, will grow in soils lacking somewhat in the basic soil elements, whereas, a soil for the successful production of alfalfa must not only have the acidity corrected but also an excess of lime in it because this plant uses approximately 50 pounds of lime in every ton of hay produced and in this case the lime is used partly as a food.

## Why is Not More Lime Used?

Regardless of the policies of our agricultural colleges and the standards of

## Every Lime Manufacturer Should Read This!

THERE is much food for thought in what Mr. Voorhees has to say on this page. Perhaps no other man is better qualified to discuss the subject selected. He is a graduate of one of our foremost agricultural colleges. He has been actively engaged in agricultural experiment station work and has been a farm manager. For several years he was in the closest touch with lime manufacturers as agronomist of the Agricultural Lime Bureau of the National Lime Manufacturers' Association. He is familiar with the problems of lime manufacturers. Since his retirement from that position about a year ago he has spent practically all his time out among the farmers of New York State. He has obtained a view point much broader than either the producer or the agricultural experiment station expert. Read what he has to say.—Editor.

fertility set by them, there still remains the fact that in practically every state vigorous campaigns are conducted for a more liberal and more intelligent use of lime, and these campaigns extend over the entire year, not merely the planting season of any one crop. Despite these campaigns, not more than one-tenth of the lime necessary for normal production of farm crops is used and the sales

of lime to farmers increase very slowly.

Why is it that this condition prevails? First, lime has rapidly increased in cost and the farmer has not been convinced of the necessity of such high prices or the value of the returns from the use of lime though he knows his land needs it. Second, it is not easily obtained. Third, it is difficult of storage and distribution. Fourth, much poor quality material has been sold to farmers which has developed a lack of confidence.

## Profit Taking Can Wait

Discussing these points, I have made the bold statement that the cost of lime is too great. Manufacturers generally will take issue with me on this point, and perhaps they are justified in so doing, but the manufacturer must realize that he has an enormous business awaiting his constructive efforts. James B. Duke popularized the cigarette and stabilized the tobacco industry by selling ten cigarettes for five cents, and in the course of a generation a business powerful in its magnitude has been built up on this idea.

The same opportunity awaits the manufacturers of lime. It is perfectly proper that the manufacturer of lime should have his profit and the opponents of this argument will state that it is impossible to reduce the price of lime, that the trouble is with the farmer. I agree that there still remains much opportunity to spread the gospel of the use of lime, but it is my contention that a much greater appreciation of lime will come through a greater use of it brought about by a lower cost, while the price will ultimately be adjusted in a manner satisfactory both to farmer and manufacturer.

With such an adjustment and by fair, vigorous and educational advertising it is my opinion that the business may be quadrupled in ten years. The manufacturer will argue that many farmers are now buying car-load lots of the highest grades of lime, but an analysis of these sales will show that the bulk of all lime sold to the agricultural trade goes to the large and specialized farmers, whereas, the bulk of future trade lies with the general farmer who is managing his own farm with limited capital, and it is in him that the lime manufacturer has an asset, and to him the lime manufacturer must look for the expansion of his business.

## Distribution Must Be Easier

It is not a difficult matter perhaps for

farmers to buy lime in car-load lots, but at the present prices a car-load lot is too much for a single farmer to handle. Even though he may need it, he has not the money to finance such a project. Second, it is almost unobtainable in less than car-load lots. Some arrangement should be made whereby the farmer may go to a local dealer and obtain what he needs. The dealer suggests that he cooperate with his neighbor but the farmer finds that this is seldom practicable. If it were possible to have bins similar to those used by the coal dealers where the farmer might go and load his wagon the sale of lime would increase tremendously in the course of a few years.

At the present time, lime is sold in many various forms, some of which are difficult of storage, impracticable or even impossible; and others are very difficult and very disagreeable to distribute on land. Laborers leave the farm and go to the city for employment in preference to remaining on the farm where disagreeable tasks form a part of his work for which he is comparatively poorly paid. Manufacturers should, through concerted action, standardize their sales to the forms of lime which are easily and safely stored, and to those kinds which are easily distributed. In this connection the package is a limiting factor requiring consideration.

#### Must Protect Farmer From Low-Grade Stuff

Probably the one thing which has done more to injure the agricultural trade than any other is the fact that the manufacturer of lime has in the past sold low-grade products to the farmer. By this I mean, that every by-product of the kiln or furnace, whether manufactured from a pure or impure stone has been sold to the farmer. This may have been done in the most honorable manner but still it has been reflected in the sales because poor grades of lime often fail to show results capable of being distinguished by the eye and the observation forms the farmer's basis of judgment and decision.

It may not seem an economic proposition from a broad point of view to put the by-products of the kiln on the waste heap but at this stage of the business it is absolutely essential that standard grades be offered to the farmer. People today are looking for quality more than ever before and this one factor if properly maintained will do much to put the lime business on a satisfactory footing.

#### Agriculture a Field of Great Possibility

These views may seem revolutionary but there is much evidence in their support both from the farmers' point of view and the manufacturers' point of view. I do not mean anyone to infer that the lime manufacturers join a charitable union but it may well be considered whether the city where building lime has

## U. S. Railroad Administration Has Agricultural Section

Lime and Limestone Producers Should Cooperate for Better Farms and Greater Crops

THE AGRICULTURAL SECTION of the Division of Traffic of the U. S. Railroad Administration, with J. L. Edwards as manager, was established for the twofold purpose of more closely coordinating the agricultural development work of the railroads under Federal control with the allied departments of the Government and of prosecuting this work with increased vigor. For the accomplishment of the former a policy of close and complete cooperation with the Department of Agriculture and the Food

tural agents of the carriers toward aiding in the most practical and energetic manner possible the campaigns undertaken for increased food production.

For carrying on the work of the Agricultural Section, the 48 states have been divided between two general committees with special subcommittees to the end that the agricultural departments of the railroads in each state and in the country at large may cooperate with each other and with the appropriate Federal, State, and county authorities, including also civic bodies, manufacturers of farm implements and fertilizers, local bankers and business men, that they may harmonize and coordinate their efforts along definite lines and that possible duplication of work may be eliminated.

The experimental or scientific part of the work is no longer undertaken by the agricultural departments of the railroads, but is left to the United States Department of Agriculture and the several states. The railroad agricultural agents' work is more along the lines of dealing with the transportation problems involved; encouraging the production of new or different farm products and increasing that of old; bettering their quality and preparation for market; aiding in finding markets; and bringing about improvements in farm methods as approved by competent authorities.

With the coming of peace and restoration of normal conditions, the movement of returning soldiers, industrial workers, and others to the farms is expected to assume large proportions. The agricultural representatives of the railroads have cooperated in all sections in getting together the information necessary in the consideration of the plans proposed by the Department of the Interior for reclaiming land for returning soldiers. They have also prepared a great deal of information on the subject of farming opportunities along the several railroads that prompt and intelligent reply may be made to the many inquiries which are coming in from prospective farm settlers.

It is our belief that the opportunities for profitable farming have never been so good as now and that with the wider diffusion of modern agricultural knowledge and the strong demand for farm products at fair prices there will be in the next few years a measure of general advancement among progressive farmers never approached before.—W. G. McAdoo.

### Railroad Administration Favors Cooperation

**ROCK PRODUCTS** — Speaking generally, the railroads in all sections of the country where limestone is needed to improve soil conditions are active, through their agricultural agents, in pushing the largest possible use of agricultural lime and ground limestone. The work of these agricultural agents, in cooperation with the Federal and State Departments of Agriculture, is along the lines of advocating the use of lime with the farmers, directing him to sources of supply, and looking after any difficulties arising in the way of transportation or distribution. The railroads have made very low rates on ground limestone, and I am sure you will find, on inquiry of almost any producer of same, that he has had active and useful cooperation from the railroads, as the importance of increasing the use of agricultural lime and ground limestone is greatly appreciated.

J. L. EDWARDS,  
Manager, Agricultural Section,  
U. S. Railroad Administration.

Administration was early adopted and has since been followed, while the latter purpose was made effective by directing the chief efforts of the agricul-

ture sold readily has not been overdeveloped, while agriculture, the basic industry, especially of the East, has remained undeveloped and whether the economic interests of the lime industry as a whole are not materially affected by the prosperity of the farmer because poor production is a loss to everyone.



# Cement Co. Kept Alive by Agricultural Limestone

THE ACCOMPANYING views show a part of the plant of the Empire Cement & Limestone Co., Portland, Ga., which cement men will recognize as the Piedmont-Portland mill, that went out of the cement business during the days of cut-throat competition—a few years ago.

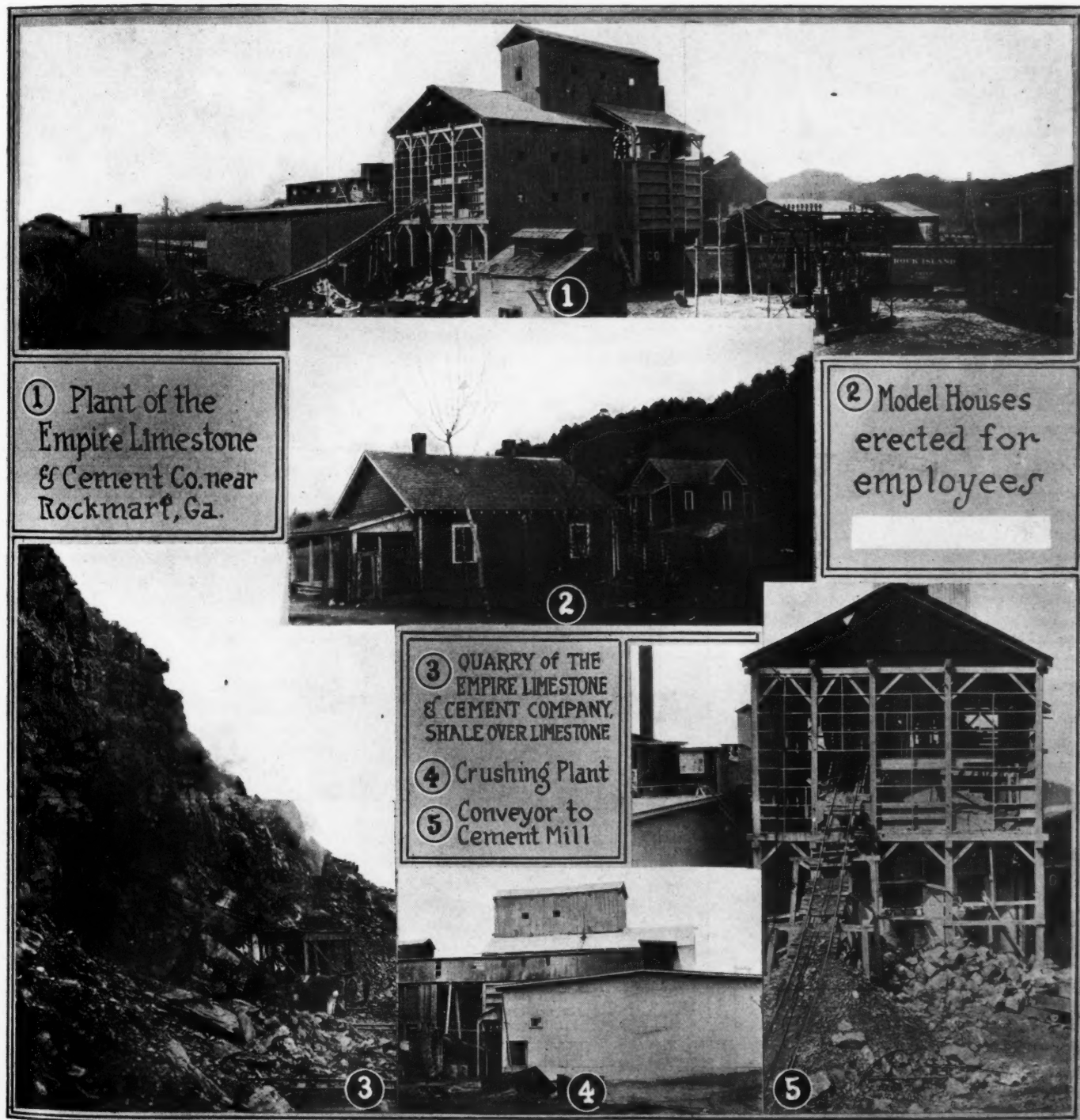
The company has since changed hands and has entered a period of prosperity, during which it has lifted practically

all its load of debt and is fast getting around to the point where it can again enter the cement field with a good organization, a rebuilt plant, and a bank balance.

The cause of its rebirth was the utilization of a part of its plant for the production of agricultural limestone. The quarry and crushing plant has been operated to good advantage as has also the preliminary grinding equipment of the cement plant.

A part of the plant containing one kiln was leased to the American Potash Co., which is engaged in producing a potash fertilizer from the shale overlying the limestone in the adjacent quarry operated by the cement company.

The limestone is sold under the brand name "Piedmont." The president of the Empire Cement & Limestone Co., is Wade H. Davis, of Atlanta; the secretary and treasurer is S. I. Spiggle.



① Plant of the Empire Limestone & Cement Co. near Rockmart, Ga.

② Model Houses erected for employees

③ QUARRY of the EMPIRE LIMESTONE & CEMENT COMPANY, SHALE OVER LIMESTONE

④ Crushing Plant

⑤ Conveyor to Cement Mill



# Prominent Railway Man's View of the Highway Improvement Program

Samuel Rea, President of America's Greatest Railway System, Brings Up Some Pertinent Points

**YOU HAVE ASKED ME** to reply to the question whether or not the railroads oppose highway improvement. While I can speak officially only for our own company, I have no reason to suppose that the policy of other railroads on this question differs materially from ours.

Far from opposing the good roads movement, we have always strongly advocated it, and on a number of occasions in the past have extended such active aid as was in our power towards the rebuilding, improvement and extension of public highways. We believe this to be not only good public policy, but directly beneficial to the railroads. For this latter view, several reasons exist. In the first place good roads are necessary as approaches to our stations. Secondly, and perhaps more important, properly developed systems of highways greatly aid the prompt removal of freight from railroad stations, and so tend to solve the problems of terminal congestion, which every year are becoming more and more pressing. Moreover, it is obvious that very short hauls of freight, particularly in and about our large cities and other terminal regions, can be more efficiently and economically performed by motor trucks, or even by teams, than by the use of steam railroad lines particularly constructed for long-distance traffic.

These, in brief, constitute the principal ways in which better highways immediately help railroads operating in the same territory. In general, also, we feel certain that the railroads will profit in the long run by highway betterment just as they will by any progressive movements tending to open up and develop the country and increase the general activity of commerce, industry and agriculture.

## Formerly Carried Road Material at Nominal Rates

In the past, our company has not infrequently carried ashes and slag free, or at practically nominal rates, for the purpose of road-making. We have also given very low rates on crushed stone for the same purpose. A notable instance of this was in the Delaware and Maryland peninsula, a region which has little natural road-making material and must, therefore, depend upon stone or other substances brought from consid-

erable distances. In this particular case, the highways constructed from the crushed stone which we carried at extremely low rates paralleled our own lines, but nevertheless we believe the encouragement of these good roads was a beneficial policy to our company, even from a purely selfish point of view.

It is not likely that we could again make rates on such a basis as that to which I have just referred, as it seems now to be a settled principle that all

## Are the Railways Opposed to Highway Improvement; If So, Why?

### BEING ON THE PROGRAM

to discuss this subject at the recent Buffalo convention of the National Crushed Stone Association, Thos. McCroskey, manager of the American Ballast Co., Knoxville, Tenn., wrote to Samuel Rea, president of the Pennsylvania R. R. Co., direct.

Mr. Rea is recognized as the leading railway executive of the country. He is an engineer, by education and experience and is thoroughly posted on the engineering as well as the economic problems of highway construction and maintenance and railway construction and maintenance.

The question was scheduled for discussion at Buffalo because there have been persistent rumors that the Railroad Administration at Washington was none too friendly to the highway improvement program; and that the proposed increases in freight rates of a few weeks ago was only an illustration of this rumored unfriendliness.

Mr. McCroskey was unable to be present at Buffalo, but Rock Products has obtained permission to publish the letter in full. As a good roads promoters every rock products producer should read the railway man's discussion. There is food for thought in it.

rates must be upon a commercial basis and that every kind of traffic must pay its way. Formerly, however, we felt free to do so, and I merely mention

the matter to show how we gave practical effect to our policy of encouraging highway development.

## Highways Used for Profit Should Have Income From Users

There is one aspect of this matter, however, in which I feel reform is justly needed and that is the question of taxation. At present, the railroads are carrying an enormous and ever increasing burden by reason of the taxes which they are obliged to pay to the various states through which they operate. A considerable portion of the taxes so paid is devoted to the maintenance and improvement of public highways. If these are to be used for purely commercial purposes, such as the rendering of short-distance freight and express service, whether by private individuals or regularly organized companies, I feel that a fair portion of the burden should be sustained by those who thus utilize the highways for profit.

As matters now stand, a carrier by motor truck or team has his roadway given to him free by the state and maintained at the state's expense, out of general taxation. A railroad company, on the other hand, which is also a public carrier, not only has to buy its right-of-way and build and maintain its roadway at its own expense, but is obliged to pay heavy taxes to the state, which are then actually used, in part, to build and maintain the roadways of the other carriers. This is not a just or fair situation, and I am sure all will agree that correction is required.

## Carrier Motor Trucks Should Help Pay

Motor trucks cause more wear and tear on highways than any other vehicles, yet in many, if not all states, they pay only the same license as pleasure cars. The increasing size of these trucks, which now range in capacity from six up to ten tons apiece, is also creating another problem. I refer to the danger of using vehicles of this kind on many of the overhead bridges which have been constructed across railroad tracks in the process of eliminating grade crossings. In some places these bridges have been constructed and maintained solely by the railroad companies, and in other places the expense is borne partly by the railroad companies and partly by the county or State.

In their present condition, such

bridges, having been built for and adapted to the traffic of ordinary vehicles, often make it necessary for heavy motor trucks to make long distance detours in order to avoid passing over them. There is, of course, always the danger that a driver, through ignorance or carelessness, or in a reckless effort to make up lost time, might run a heavy truck across a bridge which is not safe for it. This involves a risk, not only of a deplorable accident to the truck and its attendants, but also of possibly causing a railroad wreck by blocking the tracks beneath, if the bridge should give way.

Ultimately, no doubt, a demand may be raised for the strengthening of these

bridges, and this will involve added expense to the counties, states, or railroad companies, or all three. Such a situation affords an added reason why motor trucks operated for hire, and actually rendering the service of public carriers for profit, should bear, through taxation, their fair proportion of constructing and maintaining the highways and bridges which they use.

On the general question of highway construction and improvement, I wish to reaffirm my position that our company favors the good roads movement when and as commercial and financial conditions justify.

(Signed) SAMUEL REA,  
President Pennsylvania R. R. Co.

## Railroad Agricultural Agents to Hold Big Meeting

Resumption of Farm Development Work Is Planned—Convention of Railroad Agricultural Agents at Memphis April 2

THE UNITED STATES RAILROAD ADMINISTRATION'S agricultural section, in cooperation with the Department of Agriculture, is making plans to resume its agricultural development work throughout the country, which, on account of the war, was, of necessity, curtailed to a great extent.

### Call for General Meeting

With this end in view, a call has been issued for a general meeting of some 200 representatives of railroads engaged in this particular class of endeavor, who will assemble at Memphis, Tenn., on April 2 for a three days' session. Agents of the Department of Agriculture have been invited to take part in the deliberations, in order that there may be the fullest and heartiest cooperation between the two governmental agencies.

The problems to come before the gathering will include those of marketing, agricultural extension methods, raising of more and better live stock and poultry, dairying, fruit growing, information for home seekers, best methods for assisting new settlers, farm credits, and cooperation of local organizations.

### Activities During the War

During the war railroad agricultural agents were engaged principally in helping to increase the food production of the country. When hostilities ceased the Railroad Administration arranged for a reorganization of the forces of the individual roads which did so much to help in building up the country before the outbreak of the war. A more thorough cooperation with the Department of Agriculture than previously had obtained was also brought about.

Reports from chambers of commerce,

bankers, associations of farmers, newspapers, and business men received at the Railroad Administration indicate that there is a strong sentiment manifest throughout the country toward better farming, which means heavier and more economic production, with improved marketing conditions.

At the Memphis meeting a program will be adopted for utilizing this sentiment to the best advantage in order that the general development of the agricultural resources of the country may be carried on with even greater energy than was displayed before the war.

### Railroad Administration to Compile Freight Revenue Statistics

GENERAL ORDER No. 59 issued by the Director-General of Railroads February 26 provides for monthly reports from Class 1 (interstate) carriers giving (a) number of carloads; (b) number of tons; (c) total revenue, point waybilled from to waybill destination, of 59 groups of commodities. No. 38 of these groups includes sand, gravel and stone. No. 51 includes cement and lime.

It is announced that the reports are required for the purpose of developing the volume of carload freight traffic by specific commodities, and the total volume of "less carload" freight, and the revenue on both classes, interchanged between points within the same state; between each state and the District of Columbia and each other state; between each state and the District of Columbia and Mexico; Canada; and with all other foreign countries (in one item). Alaska, Hawaii, Porto Rico, and the Philippines will be

included in the item "all other countries."

Traffic having origin and destination in one state, but moving beyond state lines in transit, will be reported as from and to the same state. Traffic having origin and destination in the United States, but moving beyond the international boundaries in transit, will be reported as from the state of origin to the state of destination.

### Chicago Gravel and Stone Men at Odds Over Freight Rates

A HEARING held March 20 by the Chicago Western District Freight Traffic Committee at Chicago brought out sharply the antagonism between the sand and gravel and the crushed-stone producers of the Chicago district. The hearing was held on the petition of the gravel men who claim that one of the results of Mr. McAdoo's famous order No. 28 was to discriminate against sand and gravel.

Crushed stone comes into the Chicago market on freight rates based on per car switching charge—most of the plants being within the Chicago switching district. Sand and gravel plants are nearly all located outside of the switching district and pay freight rates based on a zone system, although the hauls in some cases are no longer than those in the switching district. A number of crushed-stone plants are in the same fix.

The result is that practically no gravel plants can ship into Chicago by rail in competition with crushed stone, which it was said at the hearing, was now selling at \$1.15 per cu. yd. on railroad sidings in the city of Chicago. The stone, it was said, weighs 2,500 lbs. per cu. yd. against 3,000 lbs. per cu. yd. for the gravel or sand. (This is \$0.92 per ton including freight—20 to 40c per ton—for the crushed stone). Gravel to compete with this on a 50 to 60c per ton freight rate, it was claimed, would have to be produced for less than 26 2/3 or 16 2/3 cents per ton—an obvious impossibility.

W. E. McCornack, a Chicago attorney, and Burton H. Atwood, of the Chicago Sand and Gravel Association, presented the arguments of the sand and gravel men, and A. J. Sullivan, of the Illinois Crushed Stone Association, gave the stonemen's point of view. Mr. Sullivan also took the opportunity of applying for the pre-war freight rates.

### Awarding Contracts for Roads in Wisconsin

MILWAUKEE, Wis.—Contracts for roads, federal aid, state and county are being awarded throughout Wisconsin and the mineral aggregate industry is looking forward to a good season. The Wisconsin Mineral Aggregate Association expects considerable activity from now on.



# Secretary Redfield Takes a Hand in a Crushed-Stone Freight-Rate Case

Claims the Solvay Process Co. Is Entitled to the Rate Originally Contracted for

WASHINGTON, D. C.—Declaring that the matter is one which indirectly affects every person in the United States, Secretary of Commerce William C. Redfield has intervened in the case of the Solvay Process Co. vs. the United States Railroad Administration and has filed a brief urging that the rate complained of be revoked and the former and lower rate again made effective. This is declared to be the first time in the history of the country that a Cabinet officer not directly affected has intervened in such a case.

In the brief he has filed with the Interstate Commerce Commission, the Secretary quotes the organic act of February 14, 1903, creating his department, which states that "it shall be the province and duty of said department to foster, promote, and develop foreign and domestic commerce, the mining, manufacturing, shipping and fishery industries, the labor interests and the transportation facilities of the United States."

Decisions of the United States Supreme Court are quoted to show that transportation is an integral part of domestic industry, and decisions of the Attorney General to show that commerce is not restricted to the purchase, sale and barter of commodities, but includes also navigation, intercourse, and the reception, transportation and delivery of passengers and freight by land or water. Through the organic act and decisions of the Supreme Court, the Secretary of Commerce has a clear right to appear in any cause which may directly or indirectly affect foreign and domestic commerce and transportation.

The Secretary makes it clear that he does not appear for the Solvay Process Co. as a private litigant, but in defense of the principle of public service. "In this action, the Secretary of Commerce appears for the whole people of the United States, who have imposed upon him the mandate to foster, promote, and develop their commerce, of which transportation is an essential part," he says in his brief.

The history of the case is as follows:

In 1909 the Solvay Process Co. sought an additional source of limestone to supply its works at Solvay, N. Y., and had under consideration two locations, one at Jamesville, N. Y., on the Delaware, Lackawanna & Western Railroad, and one at Manlius, N. Y., on the New York Central Railroad. After considerable negotiation the Delaware, Lackawanna & Western Railroad Co. estimated that

it could transport the limestone from Jamesville to Solvay at 20 cents per gross ton, furnishing the necessary cars and doing the switching at both ends, but that if the Solvay Process Co. would furnish the cars, lay the tracks on its own property, and do the switching at both ends, the freight could be handled at 15 cents per gross ton. The Solvay Co. accepted the latter proposition and invested over one million dollars in the purchase of the quarry property and plant, together with steel railroad cars for transporting the limestone, and, in addition, it constructed the necessary switches and sidetracks on its property to handle this business.

The run from the interchange point at Jamesville to that at Solvay, approximately 8 miles, is down grade with the exception of a mile or so on the Solvay end. The railroad company has always handled this business with one engine and one crew, picking up the loaded trains already made up by the Solvay Process Co. at the interchange point at Jamesville, hauling them to the interchange point at Solvay, and there picking up a train of empty cars and hauling it on the return trip to the interchange point at Jamesville. Two trains each way are thus hauled every day throughout the year, with the exception that for a part of the time only one train was run on Sunday.

The running schedule was so fixed as not to interfere with the regular traffic of the railroad company. The cost of hauling the limestone from Jamesville to Solvay under this arrangement is much less than that for hauling freight under ordinary conditions. Mr. Learoyd, who was assistant general freight agent of the Delaware, Lackawanna & Western Railroad Co. at the time the arrangement was made, and who was familiar with the negotiations in connection with the 15-cent rate and took part therein, afterwards becoming general freight agent of the road, which position he held until the middle of October, 1917, stated that the business of the Solvay Co. under this arrangement fully met the expectations of the railroad company and that it was a very profitable business for the carrier at the 15-cent rate; that up to the last time he had a knowledge of it the railroad considered that 15 cents was a reasonable rate for this traffic; and that when a general increase of 5 per cent was made in freight rates "about 1916," the rate on the Solvay business was not raised, because the business was paying at the 15-cent rate.

Although the business of transporting limestone from the quarry to the works was constantly increasing, it was handled by a single crew and engine, though a larger engine was substituted for a smaller one, and notwithstanding that the engine expense and the wages of the crew were increased, there is nothing in the testimony to show that this increased expense per train for the hauling of the limestone was not fully met by the increased number of tons hauled in each

train, so that the expense per gross ton for hauling was not increased, as the carrier was still able to handle the traffic with a single engine and crew.

On May 6, 1918, which was subsequent to the taking over of railroads of the country by the Railroad Administration, the 15-cent rate per gross ton was increased by order of the Railroad Administration to 17 cents per gross ton; on June 25, 1918, it was further increased to 40 cents per gross ton, and, effective September 16, 1918, it was reduced to 30 cents per net ton, which is more than double the original rate.

"It appears that the rate of 15 cents per gross ton formerly charged upon the material transported was profitable to the transporting company," continues Secretary Redfield in his brief. "This former rate has now been more than doubled. The only possible reason, and the reason which in fact is definitely stated to the Department of Commerce by the Railroad Administration as the cause for the change is the need for greater revenue on the part of the railroad systems of the country as a whole."

It may not be justly pleaded on behalf of the administration, he declares, that a sufficient reason for the act complained of is the need for revenue. It is not the obligation of the railroad administration to operate at a profit. It is given the support of public funds and has, as have other public services, the basis of the taxing power on which to rest. It has, as a matter of fact, received a large sum from the Public Treasury. Its relation, therefore, to the commerce of the country is that of a servant of that commerce, and in so far as for the purposes of revenue it may take steps injurious to the commerce of that country, it departs from its essential duty, and it then becomes the obligation of that branch of the Government which is charged with the fostering and promoting of commerce to point out the facts and ask for their correction.

"It is respectfully urged on behalf of the commerce of the United States that the action of the Railroad Administration in doubling a rate which, in my belief, the testimony shows to be profitable, is an oppressive act, injurious not only to the parties directly concerned but to the commerce of the country through its normal reactions; that it can not be justified by the need of general revenues for the entire Federal railroad system; and that it should be revoked and a rate substantially the same as the original 15c rate should be established."

## Los Angeles Offers Its Cement Plant for Sale

LOS ANGELES, Calif.—The City of Los Angeles is offering for sale its Monolith Cement Mill which had been "built and operated as an aid to the construction of the Los Angeles aqueduct." The mill having served its purpose, "the aqueduct bureau is solely engaged today in the development of water, power and light." It does not wish to enter the commercial field in the sale of cement.

The plant represents an investment of \$900,000. It is offered under competitive bids with a minimum of \$450,000. Its equipment is modern with plant layout for economical operation; motive power, steam and electric; process, dry, oil burning; capacity 1,200 to 1,500 bbls; location, Monolith, on main line of Southern Pacific railroad, 117 miles south of Los Angeles. Wm. Mulholland, chief engineer, Los Angeles, will give full information.

## Road Paving Awards in Georgia; Comparison of Prices

ATLANTA, Ga.—Three contracts for road work representing an expenditure of nearly \$500,000 by Fulton county were awarded March 19 and one other temporarily held up pending consideration of objections by property owners to the type of pavement selected. When the fourth award is made, the grand total will be at the half million mark.

Contracts were awarded as follows:

Jamison & Hallowell, Atlanta; 34,000 sq. yds. bitulithic laid on old macadam, at \$2.50; Pace's Ferry road.

Brooks-Callaway Co., Atlanta; 26,000 sq. yds. stone concrete, at \$2.45; Hapeville road.

F. W. Long Co., Jacksonville, Fla.; 30,000 sq. yds., vibrolithic, at \$2.98; Cascade and Holderness roads.

The lowest bidders for the fourth contract, 26,000 sq. yds. on the Marietta road was the R. M. Hudson Co. of Atlanta, whose bid of \$1.70 for bitoslag was recommended by the committee, but the commissioners held it up on the objections to the use of the material.

Other bids on these jobs will be interesting for comparison.

Pace's Ferry road: Slag concrete, \$2.85@2.94; Stone concrete, \$2.70@3.10 (one bidder asked \$3.58).

Hapeville road: Slag concrete, \$2.75@2.79; Stone concrete, \$2.45@3.35 (two high were \$3.11 and \$3.35; others \$2.88 or below); Bitulithic, \$3.93; Bitulithic old material, \$2.50; Vibrolithic, \$2.90.

Cascade and Holderness roads: Slag concrete, \$2.65@2.87; Stone concrete, \$2.73@3.11 (highest for stone was 21 cents over next highest); Bitulithic, \$3.87; Bitulithic old material, \$2.45.

Marietta road: Slag concrete, \$2.85@

2.94; Stone concrete, \$2.50@3.45 (next highest on stone was \$2.99); Bitulithic, \$3.93; Bitulithic old material, \$2.45; Vibrolithic, \$2.90.

Brick was quoted at \$3.89 for all roads.

This letting attracted a large number of bidders, because the work was attractive. By the terms, 90 per cent cash will be paid monthly for all completed work. The vibrolithic paving mentioned is a patented pavement six inches thick.

## Bureau of Standards Advisory Committee

AT THE SUGGESTION of Warren E. Emley, Chief of the Lime Section of the United States Bureau of Standards, the president of the Lime Association has appointed the Bureau of Standards Advisory Committee of the Lime Association. Its membership consists of Messrs. W. E. Carson, F. A. Jones and Charles Warner. The duties of this committee are to confer with the lime section of the Bureau of Standards on all matters affecting the lime industry and to formulate plans of investigation and research which, in the interests of the

Lime Association, should be undertaken by the Bureau of Standards. It is expected that much good will result from the activities of this committee because the Bureau of Standards has recently exhibited a lively interest in the problems involved in the manufacture and use of lime and has shown a strong tendency to assist our industry to every reasonable extent. Already, at the instance of this committee, a number of investigations have been undertaken by the Bureau of Standards on the matter of pitting.

## Ocean Freight Rate Is Reduced on Cement

WASHINGTON, D. C.—New rates, materially lower than those made public a few weeks ago, have just been announced by the United States Shipping Board, in a schedule giving freight quotations to practically every part of the world.

A reduction to \$1 per 100 pounds has been made on cement from North Atlantic ports to Liverpool, London, Manchester, Hull, Avonmouth, Bristol, Cardiff, Glasgow, Leith and Belfast.

## Why Sand and Gravel Come High

These Are Actual Cost Figures from a Prominent Illinois Producer

### OPERATING EXPENSE

1914 Pre-war Prices		1919 Present Prices	Percentage Increase
\$125.00	Superintendent salaries .....	\$200.00	60
.25	Day labor, per hour .....	.40-45	60
1.15	Coal, per ton .....	2.65	130
.82	Freight rate, Coal .....	1.34	63
5.00	Drayage, team per day .....	7.00	40

### Repairs and Supplies

.2275	1 1/4-in. Steel Cable, per foot .....	.5365	135
.0913	3/4-in. Steel Cable, per foot .....	.2127	133
.0665	5/8-in. Steel Cable, per foot .....	.1572	136
3.20	16-in. Sheaves, each .....	7.30	128
2.95	14-in. Sheaves, each .....	6.90	134
45.00	Screen, 1 complete .....	156.00	246
.147	Engine Oil .....	.237	61
	Belting .....		100
.17	Stripping, per yard .....	.29	70
20.50	Lumber, per M—6x6, 8x8, 6x12 .....	43.00	114
19.00	Lumber, per M—2x12, etc. ....	38.00	100

### REPLACEMENT COST (Bona fide quotations, 1919)

20.50	Lumber, per M—6x8, 8x8, 6x12 .....	43.00	114
19.00	Lumber, per M—2x12, etc. ....	38.00	100
1540.00	No. 5 Crusher .....	3400.00	120
851.07	Boiler .....	2992.10	351
1870.00	Steam Hoist .....	4407.00	235
45.00	Screens, each .....	156.00	246
.25	Labor, per hour .....	.40	60



# Why Prices Will Not Drop Appreciably

## Have Reached a Permanently Higher Level to Which All Industry Must Become Adjusted as Soon as Possible

AT THE PRESENT TIME there is a marked halt in production. Industry is slowing down. Unemployment of labor increases. Some industrial concerns are failing to earn profits, because, even by shutting their plants down, they cannot save certain of their expenses or any of their fixed charges. The Government's revenues, dependent as they are upon the national income, may fall short at the very time we need them most. In brief, we are threatened with a widespread business depression and from peculiar causes, for the unsound conditions usually preceding a widespread business depression are absent.

### Belief That Prices Must Drop

The main reason why business is not going ahead better is that most people expect prices to drop. The merchant is selling, but not buying. The manufacturer holds up the purchase of his raw materials. People quote the disparity between present prices and those prevailing "before the war," and decide they will not buy much until present prices get down to "normal."

This general conviction that prices are sure to drop is putting a brake upon the entire machinery of production and distribution. Readjustment waits because we keep on waiting for it. We have waited in vain for over three months. It is interesting to observe that many manufacturers think that prices must come down, including the price of labor, but they are ready to demonstrate to you that their own prices cannot come down, nor can they pay lower wages.

Almost everything they buy somehow costs twice as much as before the war, and their labor is twice as dear. They cannot pay their labor less, if labor is to meet the increased cost of living. Now, as a matter of fact, when we investigate almost any individual one of the so-called "high prices" for industrial products, we are likely to find that individually it is not high, that is, it is not high relatively to the rest. Our quarrel is with the general level of prices.

### The General Price Level

Variations in the general price level may be compared to the tides of the sea, while individual prices may be compared to the waves. Individual prices may vary from this general level of prices for specific reasons, peculiar to individual industries, just as the height and depth of waves vary from a general level established by the tide. The causes

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controlling the general price level are as distinct from those controlling individual prices as the causes controlling the tides are distinct from those controlling the individual waves.

### Individual vs. Universal Price Influences

All prices have risen, but some have risen more, some less, than the average, for particular reasons affecting each industry. In some cases an improved organization of both employers and employees has enabled them to combine against the public and take full advantage of the price advance. The war brought about an abnormal demand for certain products like copper and steel, and they advanced faster than the average. The abnormal demand having disappeared, these prices are being adjusted.

In some cases, as in many of the industries making building materials, the war meant a great slackening in demand, an enforced curtailment in use by government order. In such instances, we are likely to see an upward swing in prices as the suppressed demand again makes itself felt. Today we are witnessing throughout the country such price readjustments, up and down, but the general price level has shown little signs of falling, as is evidenced by price index numbers. It is apparent to every thoughtful observer that some great force has affected all prices, creating a new standard to which they are all conforming.

The fundamental practical question confronting business men is whether the general level of prices is going to fall. In my opinion, it is not going to fall much, if at all. We are on a **permanently** higher price level and the sooner the business men of the country take this view and adjust themselves to it, the sooner will they save themselves and the nation from the misfortune which will come if we persist in our false hope.

### Its Dependence Upon the Circulating Medium

The general level of prices is dependent upon the volume and rapidity of turnover of the circulating medium in relation to the business to be transacted thereby. If the number of dollars circulated by cash and by check doubles, while the number of goods and services

exchanged thereby remain constant, prices will about double.

The great price changes in history have come about in just this manner. The "price revolution" of the sixteenth century came upon Europe as a result of the great influx of gold and silver from the mines of the New World. Europe was flooded with new money. More counters were used than before in effecting exchanges and prices became "high." People talked then of temporary "inflation," just as they talk of it now. But it was not temporary; it was a new price level.

A similar increase in prices all over the world occurred between 1896 and 1914 following the discovery of the rich gold fields of South Africa, Cripple Creek and Alaska, the invention of the cyanide process in mining, and the vast expansion of the use of bank credit.

### Extension of Credits

Circulating credit, that is, bank deposits subject to check and bank notes, is a multiple of the banking reserve behind these deposits and notes; and the essence of this reserve is gold. Our present monetary system is an inverted pyramid, gold being the small base and bank notes and deposits being the large superstructure. The superstructure grows even faster than the base. The deposits are the important elements. They are transferred by check from one individual to another, that is, the circulation of checks is really the circulation of deposits.

Thus any increase in the country's gold supply has a multiplied effect. The possible extent of that effect is dependent upon (1) the amount of gold available, and (2) the gold reserve requirements, determining the volume of credit that can be put into circulation based upon the gold.

### False Views of Inflation

Many people, referring to this inflation in the circulating medium, and assuming that it is temporary, are waiting for this inflation to subside.

When we speak of **inflation**, we mean: more circulating medium than is needed to transact the business of the country on a given price level. But what price level? Some people mean the level of 1913-14. Our currency is certainly inflated in terms of the prices of that period, just as the currency in 1914 was inflated with respect to the prices of 1896,

but our currency is not inflated at the present time relative to the new level of prices in the world which the war has brought. The country's volume of money will have to be judged in terms of this new price level, not in terms of a price level that is past. To speak of the present "inflation" as temporary is to assume the very thing about which

we are contending—to assume that the normal prices are those of 1914.

#### Go Ahead on the New Price Level

Business men should face the facts. To talk reverently of 1913-14 prices is to speak a dead language today. The buyers of the country, since the armistice, have made an unexampled attack

upon prices through their waiting attitude, and yet price recessions have been insignificant. The reason is that we are on a new high price level, which will be found a stubborn reality. Business men are going to find out that the clever man is not the man who waits, but the one who finds out the new price facts, and acts accordingly.

### Government Inquiry Confirms Statements That Prices of Building Materials Are Low

AS THE RESULT of a very thorough canvass of the building material and construction industry of the entire country the United States Department of Labor officials state that:

"At the close of the war the index number of building materials, not including steel, had risen only 61% over the pre-war prices of 1913, while the index number for commodities, exclusive of building materials, had risen 113%. The average increase of wages in the construction industry in 41 leading cities from 1914-1918 was only 28.5% as against a rise of 94% in commodities.

"The fact is that the cost of construction is not high today. It is low compared with food, clothing and commodities in general. It is high only in comparison with its own pre-war level. Commodity prices will undoubtedly recede because food and clothing and many other things were affected by special war conditions, for example, scarcity of transportation which prevented shipments from distant countries to the Allies. But they can not fall to the pre-war level.

"But, although some readjustments in the wages of individual trades and in the prices of individual classes of building materials may take place, the cost of construction will not come down to such an extent as to endanger a judicious investment made today in the erection of a new building. Where the rents offered will show a fair net return on the cost today of a new building after deducting a reasonable sinking fund allowance, no one should hesitate to build to lend money for building."

### St. Louis Engineers Are Investigating Prices

ST. LOUIS, MO.—An investigation with a view of determining whether the prevailing prices of building materials are justified has been undertaken by the Engineers' Club of St. Louis.

The executive committee has been directed to report at the next meeting "a method of procedure for determining whether there is justification for the

present excessively high prices of engineering materials, particularly cement, sand, gravel and brick, and for determining what steps will be necessary to bring prices within such limits as will justify renewal of engineering construction now of such vital importance to the economic life of the country."

### Surplus Building Materials to Be Sold by Government

WASHINGTON, D. C. — Surplus stocks of building materials held by the construction division of the War Department on March 1 amounted to a little over \$7,500,000, according to a report just secured by the Washington Bureau of ROCK PRODUCTS from the Director of Sales. This is a decrease of nearly \$5,000,000 from the inventory of December 31, last, which showed materials, as then on hand, valued at approximately \$12,000,000, the reduction having been largely affected through the transfer of these materials to projects which were being completed.

It is declared that the transfers to going jobs are continuing at such a rate that sales have been discontinued at many projects and the amount of building materials that will actually be sold will run to a very small amount. There are still some quantities of cement, paving and road materials, and other materials to be disposed of at certain projects, and sales are being made at the following projects:

Camp Bennings, Columbus, Ga.; Camp Polk, Raleigh, N. C.; Camp Wadsworth, Spartanburg, S. C.; Camp Hancock, Augusta, Ga.; Camp Sevier, Greenville, S. C.; Camp Wheeler, Macon, Ga.; Camp MacArthur, Waco, Texas; Camp Logan, Houston, Texas; Camp Cody, Deming, N. M.; Camp Bowie, Fort Worth, Texas; Camp Sheridan, Montgomery, Ala.; Camp Shelby, Hattiesburg, Miss.; Camp Fremont, Palo Alto, Cal.; American University, Washington, D. C.; Portsmouth Water Development, Suffolk, Va.; Bolling Field, Anacostia, D. C.; Harwoods Mill Water Development, Oriana, Va.; New Cumberland Q. M. Interior Storage Depot, New Cumberland, Pa.; Schenectady Q. M. Interior Storage Depot, Schenectady, N. Y.; Columbus Q. M. Interior Storage Depot, Columbus, Ohio; Army Supply Base, Boston, Mass.; Army Supply Base, Brooklyn, N. Y.; Army Supply Base, Norfolk, Va.; Army Supply Base, Charleston, S. C.; Army Supply Base, New Orleans, La.; Philadelphia Q. M. Terminal, Philadelphia, Pa.; Port Newark Terminal, Newark, N. J.; Raritan Arsenal, Metuchen, N. J.; Delaware Ordnance Depot, Pedricktown, N. J.; General Hospital No. 11, Cape May, N. J.; General Hospital No. 34, Norfolk, Mass.; General Hospital No. 35, West Baden, Ind.; General Hospital No. 36, Detroit, Mich.; General Hospital No. 38, East View, N. Y.; General Hospital No. 7, Markleton, Pa.; General Hospital No. 24, Pittsburgh, Pa.; General Hospital No. 28, Ft. Sheridan, Ill.; General Hospital No. 2, Ft. McHenry, Md.; General Hospital No. 9, Lake-

wood, N. J.; General Hospital No. 23, Philadelphia, Pa.; General Hospital No. 30, Plattsburg, N. Y.; General Hospital No. 31, Carlisle, Pa.; General Hospital No. 40, St. Louis, Mo.; General Hospital No. 8, Otisville, N. Y.; General Hospital No. 3, Rahway, N. J.; General Hospital No. 20, Whipple Barracks, Ariz.; General Hospital, Denver, Colo.; General Hospital, Azalea, N. C.; Walter Reed General Hospital, Takoma Park, D. C.; Debarkation Hospital No. 2, Fox Hills, N. Y.; Debarkation Hospital No. 3, 18th & 6th Ave., New York, N. Y.

### Department of Labor Investigating Effect of Freight Rates

THE DIVISION OF PUBLIC WORKS and Construction Development of the U. S. Department of Labor, Washington, D. C., is sending out questionnaires as to the effect of 1918 railway freight rate increases on the price of sand and gravel. The blanks call for a list of representative freight rates from shipping station to destination, number of miles, rate previous to the 20 cents per ton advance of June 25, 1918, and the rate in effect at the present time. The question is also asked: "At what rate did the bulk of the material move before the advance?" and "On what rate do you anticipate the bulk of material will move under existing rates?"

All those who have received blanks are urged to fill them out and return them promptly, and those have not received them should apply for them at once. The tabulation and analysis of the results is sure to be an eye-opener to the Washington officials and will very probably lead to decided reductions in existing freight rates.

### Mississippi Valley States Begin Highway Work

ACCORDING to statistics gathered by the Illinois State Highway Department contracts have already been let in the twelve Mississippi Valley states for 100 miles of concrete road work and during April contracts for at least 215 miles more will be let. No contracts have yet been let in Illinois, whose governor is holding out for \$1 a barrel cement!

Pennsylvania received bids for 53 miles of concrete road on March 20. West Virginia has let contracts for 20 miles and will let contracts for 60 miles more before May 1. New Jersey has placed contracts for 50 miles and Washington for 7 miles, all for concrete.



# Hines Would Use Freight Reductions as Club on Rock Products Producers

Makes Threat to Withhold Promised Reductions Unless Prices Are Also Reduced—  
No Reductions in Building Materials

WASHINGTON—Any reductions in freight rates on road materials, if made, will be limited to crushed rock, stone, sand and gravel for road constructions which is consigned to and the freight thereon is paid by a Federal, State, county, parish or township government, according to an announcement made on March 20 by Walker D. Hines, Director General of Railroads.

Before the matter can or will be definitely determined, however, the Railroad Administration intends to ascertain what, if any, reduction necessary to establish a stable price will be made in the price by those producing and supplying the materials.

This announcement can be taken only as a definite threat to producers of road materials that, unless they reduce their prices on materials supplied any of the governments designated above, no reduction in freight rates will be made.

At the same time, this will make it necessary for any contractors constructing roads under contract with a local government to provide in their contracts for the purchase of such materials by their principals, by whom the freight must be paid, if they are to secure the advantage of any lower rate which may be made.

No reduction is to be made in freight rates on commodities used in building construction, according to officials of the Railroad Administration, despite the fact that other agencies of the Government are working night and day in an effort to secure a resumption of construction work on a large scale.

The question of a reduction in freight rates has been hanging fire since before the first of March. In an address before the Governor's conference here early in the month, Director General Hines declared that his organization then had under consideration the advisability of reducing rates on road materials, at any rate, if not also on building materials, and that a decision could be expected within a week or ten days. No decision being forthcoming, a representative of the Washington Bureau of ROCK PRODUCTS attended the conference held every few days with representatives of the newspapers and asked Mr. Hines what action was to be taken and when some

definite information could be secured. He was told then that something would be announced very shortly, followed the next day by announcement of the decision not to reduce rates on building materials and probably not on road materials.

The Railroad Administration has consistently proceeded upon the assumption that the railroads under Government control, as a whole, must show a profit for the period during which the Government operates them, regardless of the fact that a Government agency is sup-

posed to penalize the patrons of one road in order to make up a loss on some other roads in an entirely different section of the country, as in the case of the Solvay Process Company, filed a brief in which, among other things, it was pointed out that the Railroad Administration, as a public servant, was created to benefit the public and not the railroads.

In the case of the Solvay Process Co., a more complete account of which appears upon another page, the freight rate on limestone was more than doubled, not because the old rate was not remunerative to the road hauling the goods, for it was, but because other roads were not making a profit and it was the desire of the Railroad Administration to show a profit for the system as a whole.

More than a half-billion dollars has already been dissipated by the Railroad Administration since it took over the roads, and today the organization is "broke" and has been forced to borrow \$50,000,000 from the War Finance Corporation and is endeavoring to make other loans elsewhere. Because of the depleted condition of the exchequer, Director General Hines and his associates are desperately casting about for methods of reducing costs to a point where the diminished revenues of the roads will meet their liabilities. As one way of doing this, the Railroad Administration is going to advertise extensively in an effort to induce the public to resume pleasure travel—as another way, rates on the most necessary commodities in the country will be kept up as high and as long as possible.

## No Reduction in Freight Rates on General Building Material

THE UNITED STATES RAILROAD ADMINISTRATION issues the following:

Walker D. Hines, Director General of Railroads, issues the following statement:

Various inquiries have been received as to whether the Railroad Administration contemplates a reduction in freight rates on materials used in construction of buildings, and therefore it becomes important to make it clear that no such reductions are in contemplation.

The Railroad Administration is, however, giving consideration to the question of making reduced rates on crushed rock, stone, sand, and gravel for road construction when consigned to and the freight thereon is paid by a Federal, State, county, parish, or township government.

Before the matter can or will be definitely determined it is intended to ascertain what, if any, reduction necessary to establish a stable price will be made in the price by those producing and supplying the materials.

posed to serve the public, even though it may do so at an actual loss.

So flagrant has this situation become that Secretary of Commerce Redfield, amazed that the Railroad Administration

## Big \$650,000 Lime Plant To Be Built by American Lime and Stone Co.

AS SOON as the ground plans are received from the architects, the American Lime & Stone Co. will begin construction work on the proposed new plant in Bellefonte, Pa., according to the Bellefonte Republican. It is estimated that several years will be required in which to complete the buildings, of which there will be two, and that the total cost will be somewhere between \$650,000 and \$700,000.

## Cement Exports for Fiscal Year Show Falling Off

WASHINGTON, D. C.—With the greatly increased shipping facilities now available, exporters of cement hope to make up, before June 30, for the comparatively low exports of the first seven months of the current fiscal year. Exports during the period from July 1 to January 31 were slightly lower than during the same periods of the two preceding fiscal years, according to statistics which have just been secured by the Washington Bureau of Rock Products from the Department of Commerce.

During the first seven months of the fiscal year 1919, exports of hydraulic cement, according to the department's reports, amounted to 1,139,479 barrels worth \$3,375,070, as compared with 1,592,975 barrels, valued at \$3,539,039, during the corresponding period of the fiscal year 1918, and 1,307,008 barrels, with a value of \$2,093,644, during the first seven months of 1917.

The average export price of cement during the month of January was \$3.25 per barrel, which was higher than at any time during the calendar year 1918. The December price was \$2.92 per barrel. High during 1918 was \$3.21 per barrel in October, low being \$2.15, in February. The July price was \$2.76; August, \$2.82; September, \$2.95; October, \$3.21, and November, \$3.10.

The following table shows the details of cement exports during the seven-month periods ended with January of 1917, 1918 and 1919:

1917		
	Barrels	Value
Panama .....	179,255	\$255,695
Mexico .....	50,063	104,868
Cuba .....	389,615	624,052
Argentina .....		
Brazil .....	199,977	289,915
Peru .....	58,303	97,248
Other countries .....	429,795	721,866
1918		
Panama .....	185,110	357,945
Mexico .....	64,529	170,261
Cuba .....	518,931	1,192,705
Argentina .....		
Brazil .....	305,779	677,063
Peru .....	42,046	89,342
Other countries .....	476,600	1,051,363
1919		
Panama .....	105,858	285,238
Mexico .....	70,611	222,416
Cuba .....	236,826	694,385
Argentina .....	149,418	422,353
Brazil .....	98,838	269,411
Peru .....	58,979	180,972
Other countries .....	418,949	1,300,265

Imports of cement also are considerably below those of the fiscal year 1918, according to the department. During the seven-month period ended with January, 1919, we imported 110,200 pounds hydraulic cement, valued at \$907, as compared with 839,000 pounds, worth \$5,970, during the corresponding period ended with January, 1918, and 356,500 pounds, with a value of \$2,573, during the period ended with January, 1917. All other ce-

ment imported during the seven months ended with last January totaled \$5,908, as compared with \$22,985 during the corresponding period of the preceding fiscal year, and \$12,351 during the period ended with January, 1917.

## Cement Association Adds Chemical Engineer to Staff

H. A. SCHAFFER, who from October, 1918, until March, 1919, was acting as advisory chemist and assistant to the Director of Building Materials Division, War Industries Board, Washington, D. C., has joined the staff of the Portland Cement Association as Chemical Engineer to conduct conservation studies.

Mr. Schaffer was graduated June, 1896, from the University of Pennsylvania with the degree of Bachelor of Science. From 1896 to 1914 he held positions as chief chemist or works manager com-



H. A. Schaffer

bined with chief chemist for several cement companies. From January, 1914, to October, 1918, he was member of the firm of Harrison & Schaffer, Easton, Pa., consulting engineers and chemists specializing in portland cement and fuels. Mr. Schaffer is a member of the committee of three, Society of Chemical Industry, which devised a uniform method of analysis for Portland cement and raw materials; member of the American Chemical Society; and author of a number of articles on Portland cement and methods of testing it.

## Lime Association Establishes New Southern District

A NEW WORKING DISTRICT of the Lime Association has been formed. It includes as follows: District 5, Virginia, North and South Carolina; District 10, Kentucky and Tennessee; District 11, Alabama, Georgia, Florida, Mississippi and Louisiana.

On March 10, F. E. Schnepfe, the district manager of this rather extensive territory began his work in it. For the last year he has been a lieutenant in the Engineer Corps, U. S. A., before which he was one of the field representatives of the Portland Cement Association, working in Maryland and Virginia, prior to which he was connected with the Highway Department of the state of Maryland.

Early in his travels through his district, he will call upon all the manufacturers of lime in it. The funds available are rather limited, and the need for work is urgent. It will help greatly when all manufacturers in this district become members of the association. His work for the present will naturally be confined to such sections as are most readily accessible to member companies.

## Ohio Legislature Strong for Road Maintenance

ROCK PRODUCTS—The men who are controlling factors in the Ohio legislature have agreed upon and announced a legislative program for the closing days of the present session.

At the head of the list is placed highway improvement, with strong emphasis on repair and maintenance of roads on which money has been spent to improve. "Save the roads we have already made" has more earnest supporters in the Ohio legislature than any other measure proposed.

This is the one measure that the Ohio Macadam Association has done everything possible and honorable to do to put across. Our magazine, "Macadam Service," has been the strongest factor in creating repair and maintenance sentiment in Ohio.

A. P. SANDLES,  
Secretary,

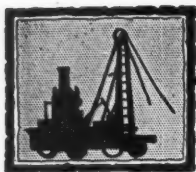
The Ohio Macadam Association.  
Columbus, O., March 7, 1919.

## Railroad Administration Re-Issues Rules for Heavier Car Loading

W. C. KENDALL, manager of the car service section of the United States Railroad Administration, has issued orders for enforcing the full loading of cars. In explanation Mr. Kendall states: "The Railroad Administration will continue its efforts to closely supervise the loading of all commodities, in order that demands for service may be promptly met, and we ask the continued co-operation of all shippers to this end."

The order refers to circular CS-12 issued May 27, 1918.





# NEW MACHINERY EQUIPMENT



## Vertical Disc Crusher for an Intermediate Grinder

**A**T LEAST one experienced producer of agricultural ground limestone is convinced that the most economical process of producing a fine ground stone is to do the grinding in two stages, taking the stone in  $4\frac{1}{2}$  or 4-in. sizes as it comes from the crushers. The first stage of the grinding he believes could be efficiently done by reducing these sizes to  $\frac{1}{2}$  or  $\frac{5}{8}$ -in. in a vertical disc crusher and the final grinding in some one of the numerous pulverizers or rolls.

Inquiry of the manufacturer of the Symons disc crusher brought out the following information in regard to their vertical disc crusher, which is in general little known to rock products producers.

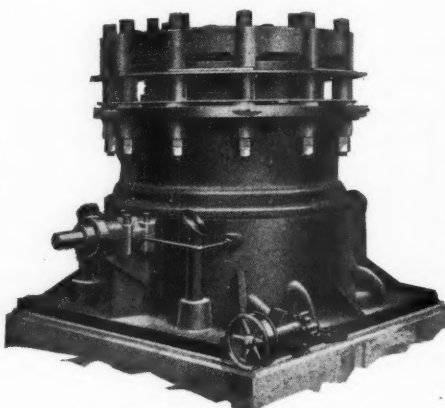
"In general the horizontal shaft crusher, which we have been advertising mostly in ROCK PRODUCTS appeals more strongly and has a larger usage among stone-crushing companies, as it is generally used as a coarse crushing machine, taking a feed of  $6\frac{1}{2}$ -in. and reducing it down to about 1 in. according to the size of the machine; the reduction being for the 48-in. machine.

"The vertical shaft crusher in some instances, as at the New Cornelia Copper Co., is used also as a coarse crushing machine. In this particular plant it is used both as coarse crushing and as fine crushing machine, the coarse crushing machines taking feed of about 4 to  $4\frac{1}{2}$ -in. and crushing down to  $\frac{5}{8}$ -in. and the fine crushing machines taking feed  $\frac{5}{8}$ -in. and crushing down to about  $\frac{1}{4}$ -in.

"We have had up a number of times the question of recommending this particular crusher for agricultural limestone, but in general it does not seem to crush fine enough to meet in every instance the requirements of this particular trade. In some instances, however, and on some limestone, producers are satisfied with product coming from a machine with the discs set to  $\frac{1}{4}$ -in., which means that a good percentage of the material is less than  $\frac{1}{4}$ -in. Where the machine is used for fine crushing we never under any conditions recommend that the discs be set closer than  $\frac{1}{4}$ -in., but when they are set as close as this the nature of the discs will not make it possible for the machine to take a feed of larger than 2 or at the outside,  $2\frac{1}{2}$ -in., so that the machine for fine crushing will take about 2-in. feed and crush it down to about

$\frac{1}{4}$ -in. This is being done in a great many plants with satisfactory results.

"The above information is based on the assumption that one stage crushing was referred to for the reason that it is the proposition which has been placed before us by the agricultural limestone companies, we have been in communication with. Inasmuch as the proposition you mention is a reduction from 4 to  $4\frac{1}{2}$ -in. down to  $\frac{5}{8}$  or  $\frac{1}{2}$ -in., we can only



Vertical disc type of crusher

emphasize what we have said before, that this is the most ideal condition for a vertical disc crusher which could be found and the work upon which the coarse crushing vertical disc crusher does

its best, giving a capacity of probably 50 tons an hour.

"In addition to the coarse crushing vertical disc crushers referred to at New Cornelia, practically this same reduction is being made by the Chile Copper Co., in Chile, which uses 48 of these 48-in. vertical disc crushers."

### Description of Crusher

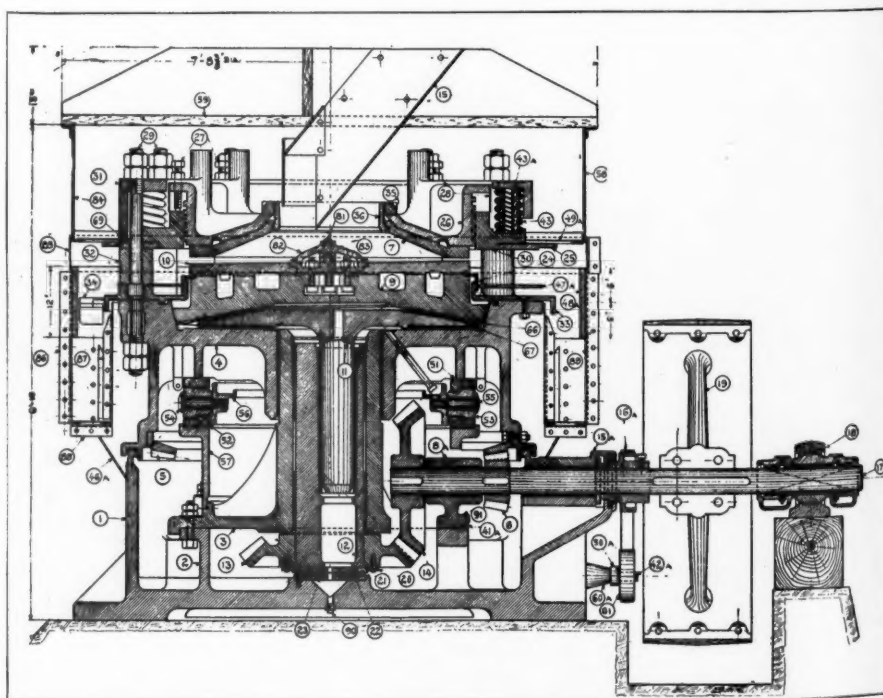
The vertical disc crusher consists of a base or frame (1) having an inside circular wall (2), to which is secured the flanged steel post (3). Around this post (3) the shaft (4) rotates, being driven by the gears (5) and the pinion (6).

This shaft (4) carries with it in its rotation parts shown, to which the upper disc (7) is adjustably attached, being held in place by heavy spring pressure adequate for crushing, but providing against abnormal strains.

The outer shaft (4) also carries with it in rotation the sliding wedge (11), the upper surface of which is spherical in form.

On this sliding wedge (11) rests the casting (9) to which the lower disc (10) is attached. The sliding wedge (11) comprises as an integral part thereof the shaft (11-A), which has its bearing inside the eccentric (12).

This eccentric (12) rotates inside of the flanged post (3), being driven by the gears (13) and (14).



Details of Symons vertical disc crusher made by Chalme.s & Williams

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

\*Cubic yard. †Agrl. lime. ‡R. R. ballast. §Flux. †Rip-rap. a 3-inch and less.

(Continued on next page.)



## Agricultural Limestone Wholesale at Plant, per Ton

(Continued from preceding page.)

Grovania, Ga.—Analysis, CaCo <sub>3</sub> , 95%; MgCo <sub>3</sub> , none—90% thru 50 mesh.....	2.00@2.75
Irvington, Ky.—(50% thru 4 mesh).....	1.90
Keystone, Ala.—(90% thru 50 mesh).....	
Analysis, CaCo <sub>3</sub> , 99.50%; MgCo <sub>3</sub> , none.....	1.25
Ladds, Ga.—Analysis, combined carbonates, 96%—(All thru 10 mesh).....	3.50
Mascot, Tenn.—Analysis, CaCo <sub>3</sub> , 52%; MgCo <sub>3</sub> , 38%.....	
(90% thru 100 mesh).....	2.50
(80% thru 200 mesh).....	3.50
(All thru 10 mesh).....	1.75
Paper bags, \$1.50 extra per ton; burlap, \$2.50 extra per ton.	
Winnfield, La.—(50% thru 50 mesh).....	3.00
<b>WESTERN:</b>	
Cement, Cal.—Analysis, CaCo <sub>3</sub> , 95%; MgCo <sub>3</sub> , 1% (50% thru 100 mesh).....	4.00@5.00
Elsberry, Mo.—(Pulverized) Analysis, CaCo <sub>3</sub> , 99.29%.....	1.85@1.95
Kansas City, Mo.—(50% thru 50 mesh).....	1.50

## Miscellaneous Sands per Ton at Plant

Silica sand is quoted washed, dried and screened, unless otherwise stated.

### GLASS SAND:

Bowmanstown, Pa.—Glass sand.....	2.50
Cedarville, N. J.—Glass.....	2.50@4.00
Dundee, Ohio—Glass.....	2.00@2.50
Gray Summit, Mo.—Glass.....	2.00@2.50
Hancock, Md.—Engine and glass.....	2.50
Mapleton, Pa.—Glass, damp.....	3.00
Glass, dry.....	3.50
Massillon, Ohio—Glass.....	2.00
Michigan City, Ind.—Glass sand.....	.30
Millington, Ill.—Glass.....	2.00
Mineral Ridge, O.—Glass.....	2.10@3.00
Montreal, Can.—Glass.....	4.00
Montoursville, Pa.—Glass.....	2.00
Oregon and Wedron, Ill.—Glass.....	2.00@2.50
Ottawa, Ill.—Glass:	
Large contracts.....	1.75
All others.....	2.00
Sands, Elk Co., Pa.—Glass sand:	
Washed, wet.....	2.50
Selected, green.....	2.50
Silica and Pacific, Mo.—Glass.....	2.00@2.50
St. Mary's, Pa.—Glass sand—Green.....	2.50
South Vineland and Cedarville, N. J.—Glass.....	2.00
Sugar Grove, Ohio—Glass.....	2.00@2.25
Thayer, W. Va.—Glass.....	2.75

### FOUNDRY SAND:

Albany District, N. Y.—Molding.....	1.75
Allentown, Pa.—Moulding.....	1.40@1.50
Bowmanstown, Pa.—Molding.....	1.50
Cleveland, O.—Moulding.....	1.25@1.75
Cleveland, O.—Core, at pit.....	.33@.75
Cleveland, O.—Core.....	1.00@1.25
Columbus, O.—Molding.....	1.50@2.00
Fleetwood, Pa.—Silica heating.....	2.15
Franklin, Pa.—Brass molding.....	1.65
Molding (gray iron).....	1.50
Gray Summit, Mo.—Molding.....	1.50@2.50
Kansas City, Mo.—Core.....	1.00
Klondike and Pacific, Mo.—Molding.....	1.50@2.50
Hellam, Pa.—Molding.....	2.00
Mapleton, Pa.—Molding, damp.....	3.00
Molding, dry.....	3.50
Massillon, O.—Steel molding.....	2.50@3.50
Montreal, Can.—Molding.....	2.75@3.25
Montoursville, Pa.—Core, Molding.....	1.25@1.50
Michigan City, Ind.—Core.....	.30@.40
Millington, Ill.—Core, damp.....	1.50
Ohio—Various points:	
Fine molding.....	2.00@2.25
Coarse molding.....	1.75@2.00
Shipments between Nov. 1 and April 1, 75c per ton added.	
Ottawa, Ill.—Core, Steel Molding.....	2.00
Ottawa, Ill.—Sand blast sand.....	2.50@2.75
Ottawa, Ill.—Sawing sand.....	1.75
Ottawa and Utica, Ill.—Molding.....	.75@1.25
Thayers, Pa.—Core.....	2.00@2.25
Thayers, Pa.—Molding.....	1.25
Wedron, Ill.—Molding.....	.75@1.00
West Albany, N. Y.—Molding.....	1.50@2.00

# Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

## Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, 3/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
<b>EASTERN:</b>						
Bowmanstown, Pa. ....	.80	1.20	1.10	.75	.75	.75
Buffalo, N. Y. ....	.85	.80	.75	.75	.75	.75
Buffalo, N. Y. (Niagara River) ..	1.00@1.15	.50@.75	1.50	1.45	1.35	1.25
Libby's Pit, Leed's Junct., Me. ....	.70	.60*	2.00*	1.20	1.25*	1.25*
Morristown, N. J. (from stge.) ..	.75	1.25	1.25	1.05	1.05	1.05
North Wilbraham, Mass. ....	.75	.75	2.00	1.40	1.20	1.20
Pittsburgh, Pa. ....	.75	.75	2.00	1.40	1.20	1.20
Washington, D. C.—Wharves....	.75	.75	2.00	1.40	1.20	1.20
<b>CENTRAL:</b>						
Barton, Wis. ....	.75	.70	1.00	.70	.70	.70
Beloit, Wis. ....	.40	.40	.50	.40	.40	.40
Cherokee & Rock Valley, Ia. ....	.40	.40	.50	.40	.40	.40
Chicago, Ill. ....	.95@1.05	.85			.95@1.05	.90
Cincinnati (Miami Gr.).....	.90	.85			.85	
Columbus, O. ....	.60	.60	.65	.65	.65@.70	.60@.70
Des Moines, Ia. ....	50@1.00	.50	1.50	1.50	1.25	1.25
Earlestead, Mich. ....	.55	.55	.85	.75	.75	.75
Elgin, Ill. ....	.40	.40	.40	.40	.40	.40
Escanaba, Wis. ....	1.20	1.20	1.20	1.00	1.00	1.00
Fort Dodge, Ia. ....	1.00	1.00	1.75	1.75	1.75	1.75
Grand Rapids, Mich. ....	.40@.45	.80@.90	.75@.85	.65@.75	.60@.70	.60@.70
Greenville and Mechanicsburg, Ohio ..	.50	.60	.60	.60	.60	.60
Hawarden & Doon, Ia. ....	.50	.50	(1.20, Hawarden)	.60	.50@.60	1.00
Illinois, Northern ..	.60	.60@.70	.60@.75	.60@.70	.60	.60
Indianapolis, Ind. ....	.50	.50			.65	.65
Janesville, Wis. ....	.50	.50			.60	.60
Kalamazoo, Mich. ....	.50@.60	.50@.60	.50@.70	.60@.80	.60@.80	.60@.80
LeMars, Ia. ....	.60	.60	1.45	1.35	1.30	1.10
Mason City, Ia. ....	.60	.50	1.45	1.35	1.30	1.25
<b>SOUTHERN:</b>						
Charleston, W. Va. (River)....	.50	1.20		1.30	1.30	1.30
Lake Weir, Fla. ....	.90	.90		1.50	1.50	1.25
Knoxville, Tenn. ....	.90	.90		1.50	1.50	1.25
Valde Rouge, La. ....	1.00*	2.25*	2.10*	1.75@2.00*	1.75@2.00*	1.00
Waco, Tex. ....	.75	.75	1.20	1.20	1.00	1.00
<b>WESTERN:</b>						
Kansas City, Mo. ....	.60	.60				
Lincoln, Neb. (on cars).....	1.00	1.00	2.10	2.10	1.90	1.90
Niles, Calif. ....	.60	.50@.70	.50@.70	.50@.70	.50@.70	.50@.70
Pueblo, Colo. ....	1.00	.75			1.75	
Roche Spur, Tulare Co., Cal. ....	1.20@1.35	1.20@1.25	.35 River sand 1/4 inch	1.50@1.75	1.30@1.40	1.25@1.40
St. Louis, Mo. ....	1.25*	1.25*	2.00*	1.25*	1.25*	1.25*
San Francisco, Cal. ....	.65	.90	.90	.70	.70	.65
Seattle, Wash. ....	1.25*	1.25*	2.00*	1.25*	1.25*	1.25*
Sherman, Mo. ....	.65	.90	.90	.70	.70	.65

## Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, 3/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
<b>EASTERN:</b>						
Attica, N. Y. ....	.50	.50	.50	.60	.60	.60
Boonville, N. Y. ....	.50@.65	.40@.65				
Burnside, Sand Pit, Conn. ....	All sand, .80 cu. yd.	.50@.75				
Yardville, N. J. ....	.50@.75	.80@1.10				
<b>CENTRAL:</b>						
Cleveland, Ohio. ....			1.00@1.25 bank sand			.60
Covington, Ind. ....						
Des Moines, Ia. ....			Washed concrete mix, 25% gravel, .70;	50% gravel, .90		.65
Earlestead, Mich. ....			.85 for all sizes			.50
Escanaba, Mich. ....						
Grand Rapids, Mich. ....	.30@.40					
Indianapolis, Ind. ....			Washed concrete mix, .55			.55
Janesville, Wis. ....						
Moline, Ill. ....	.65*	1.50*	.85*	1.40*	1.75*	1.30*
Oxford, Mich. ....	.65	.65	.85	1.20	1.20	1.20
Portsmouth, Ohio. ....						
Saginaw, Mich.—(River dock) ..			.50 for all sizes			.60
Summit Grove, Ind. ....						.55@1.00
Terre Haute, Montezuma, Ind. ....	.60					
Toledo, Ohio. ....			.75 for all sizes			.40
Wabash Valley District, Ind. ....						
Waupaca, Wis. ....						
Winona, Minn. ....			Pit run gravel under 2-in., .70			
<b>SOUTHERN:</b>						
Howcott, La. (50% and up in rock content)						.65
Knoxville, Tenn. ....	.90		.44	.44		
Lindsay, Tex. ....						
Memphis, Tenn. ....	.65@.90	.65@.90			.85@1.10	.85@1.10
<b>WESTERN:</b>						
Valde Rouge, La. ....						
Kansas City, Mo. ....	1.00	1.00				
Pueblo, Colo. ....						
St. Louis, Mo. ....			River Run .75 unscreened			1.40

\* Cubic yard. B Bank. L Lake. || Ballast.

# General News From the Rock Products Markets

## Basic Building Material Prices at Minimum; Rise Probable

NEW YORK—Inquiries over the week-end showed some contradictory features, but these were plainly those of supplemental materials and equipments, it being made fully apparent to inquiries on Saturday that basic materials in the metropolitan district of New York were at their minimum levels and were upon the point, moreover, of advancing, possibly to a degree to offset the new steel price reductions, because of a most unexpected turn of events in the matter of brick and cement shipments into this market, according to the Dow Service Daily Building Reports.

Basic building prices are lower in New York and vicinity than at any other city in the United States, east of the Rocky Mountains, largely on account of water transportation facilities and yet New York has so far shown the least volume of forward building construction going to actual work. It is, however, far ahead of any other community in the country in the matter of projected building enterprises. The tendency has been to await steel price adjustments, but structural steel represents only 16 per cent of the cost of a building whereas brick, cement, lime and plaster and lumber represent, in each case a much greater percentage. Because of the moral influence that steel has upon building activity, big city construction work was deferred in the belief that once a stabilization of steel prices became a reality, other commodities would strike their minimum and building could proceed.

Structural steel and lumber were the only items in the basic material classification that enjoyed war-time demand in excessive proportion, resulting in price inflation. All other basic commodities were practically eliminated, both as to use and manufacture. These commodities are now coming into their customary markets, with production costs higher because of depreciation during long periods of inactivity, the necessity of breaking in new organizations, the higher wage levels demanded by "wheelbarrow labor" which will become scarcer rather than more plentiful as the season advances, and the heavier transportation charges that are now being forced upon

all manufacturers handling rough materials down the Hudson to this market, which will probably reach a head this week: all combine to fix the present price quotations as the positive minimum.

Far sighted building investors are being advised to set the item of present building cost to one side in favor of the closer consideration of getting contemplated work under way at the earliest possible moment so as to meet the forthcoming renting season while the present era of high rents and long leases exists and the fixing of the minimum steel price removes the last barrier to a free building market throughout the entire country.

## Californians in Meeting Ask Another Bond Issue for Roads

SAN FRANCISCO, Calif.—Unanimous approval for a new State Highway bond issue to be submitted to the people for the completion of the original system and the construction of new roads was voted at the meeting of delegates from all parts of California held in San Francisco, February 12.

It was also decided to recommend that the legislature incorporate in the proposed new bond issue the sum of \$20,000,000 which the State Highway Commission reported was the amount needed to complete the original State Highway system and for the state to build in their entirety the cooperation laterals for which \$3,000,000 was set aside in the \$15,000,000 issue to be used to aid the counties.

A roll call of counties brought out a total of 39 proposed new highways of an aggregate estimated cost of \$22,646,000. The executive committee selected 17 for recommendation to the legislature, involving an aggregate estimated cost of \$15,015,000.

Later, the special hearing on the bond issue before the state legislative committees at Sacramento packed the assembly chamber with boosters and not a negative vote was heard.

The report of the special road committee calls for an issue of \$42,500,000. There are nearly 30 items totaling \$22,500,000 for new construction, leaving

about \$20,000,000 to complete the work already programmed.

That the bond issue will be favored by the legislature is assured.

Sonoma County has asked the State to cooperate in building a highway from Sonoma to the sea, costing between \$750,000 and \$800,000.

San Mateo and Santa Clara Counties have formed a joint highway district to carry out a skyline boulevard project; \$150,000. State appropriation is now available.

A 20,000 acre irrigation project near Woodland is well under way; nearly \$1,000,000 will be expended.

A highway is planned to connect Suisun and Rio Vista, a distance of 25 miles, to cost \$350,000.

It is the general impression among leading business men that there is great prosperity immediately at hand and that the cities of the state will make great strides along commercial and industrial lines during the next few years.

## Building Business in South Central States

MEMPHIS, Tenn.—The sand and gravel business here like the general building supply trade is a little quiet. Yet conservative factors say that it promises to be more active in the late spring and early summer. There is considerable road work being figured in Tennessee, Arkansas and Mississippi. The preliminary contract for the foundation work of the Methodist Hospital was let at Memphis a few days ago. Things are moving smoothly with reference to the Memphis Auditorium and municipal market. Chattanooga on March 11 voted for a municipal auditorium in the nature of a memorial.

The heavy rains of a few days ago causing loss of life and property made big demands and requisitions on the gravel and stone trade, the railroads all needing rapid assistance. For about four days passenger and freight traffic was impeded by washouts.

The Batesville Gravel Co. office in Bank of Commerce and Trust Bldg., Elliott Lang, manager, reports outlook good for spring and summer activity. They operate chiefly on railroad gravel.

The Missouri Portland Cement Co., Memphis, reports good inquiry at this time on sand and gravel. It is operating on the river. The company is featuring "Red Ring" cement, Mississippi River sand and gravel and torpedo gravel for top dressing of roads. H. L. Block, president; H. P. Johnson, vice president, and A. A. Dodson are in active charge of the Memphis branch.

## Crushed Slag Wholesale at Plant Per Ton

City or shipping point	Screenings, ¾ inch down	¾ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Buffalo, N. Y.		.85 for all sizes; roofing 1.75				
Canaan, Conn.	1.00	Rf'g 3.00	1.15	1.10	1.05	1.00
Pittsburgh, Pa.		1.00 for all sizes; roofing, 1.50@2.50				
Youngstown, O.		1.00 for all sizes; roofing 1.25				
Ensley, Ala.	.90	.90@1.20	1.00		.90	.85
		Roofing 2.05				



# General News From the Rock Products Markets

## Four Chicago Quarry Companies in New Combine

**C**HARLES A. KLOTZ, the well-known Chicago quarry and crushed stone man, has brought about the consolidation of four of the crushed stone companies operating in or near Chicago, with the Producers' Material Co., formerly a sales and delivery organization. Mr. Klotz is president of the new concern.

### Property Valued at \$1,500,000

The value of the properties merged exceeds \$1,500,000, and includes the quarry of the Illinois Stone Co. at Lemont, two quarries of the Universal Crushed Stone Co. at Racine, Wis., the quarry of the Artesian Limestone Co. at Grand and Campbell avenues, Chicago, the quarry of the Argo Stone Co. at McCook, and a lease held by the Argo company on a quarry owned by the Chicago Union Lime Works Co. at the same place.

Although known as a separate corporation, the Universal Crushed Stone Co. had been controlled by the Illinois company, which also surrendered its fleet of barges and tugs, as well as dock facilities to the Producers' Material Co.

The consolidation has taken place in the midst of a price investigation by a state legislative committee and Mr. Klotz was under the necessity of defending the new institution. He is quoted as having told the newspaper men that: "The idea of a trust is absurd." The properties acquired by the Producers' Material Co. have been owned by the same interests for some time. The only purpose of the consolidation is to simplify the organization, avoid duplication, and co-ordinate operation to secure greater efficiency and reduce cost of production."

## Big Increase in Construction Contracts in February

**T**HE DEPARTMENT OF LABOR authorizes the following:

In the section of the country east of the Missouri and north of the Ohio Rivers, the contracts awarded for building and engineering operations during the month of February amounted to approximately \$121,000,000. The amount of the contracts awarded in the same territory during January was \$50,731,000.

The bulk of this work is done by private individuals and corporations, a fact which the Division of Public Works and Construction Development of the Department of Labor accepts as indicating that private interests rapidly are resuming building activities. During the war period a large percentage of work was carried on by the Federal Government. At present the amount of contracts

awarded by the government is negligible and that done by states and municipalities not an unusual proportion.

## Fischer of Memphis Joins Stone and Gravel Company

**M**EMPHIS, Tenn.—The Greenville Stone and Gravel Co., of Memphis and Greenville, Miss., at which latter point it has operated for ten years a river plant doing a large supply business through the Delta and with the Y. M. and V. R. R. has moved its Memphis office to the Fischer Lime and Cement Co. on Walnut street.

W. W. Fischer, has become vice president of this company and he is a decided acquisition being an active material man with wide connections in Southern centers. The company does not operate a yard in Memphis. Its business is along the line of concrete gravel.

## Road Building Programs in Many States

**I**N CALIFORNIA an appropriation of \$3,000,000 for the Tahoe-to-Ukiah highway has been asked from the state,

and bills have been introduced in the legislature for the construction of roads from the San Joaquin valley to the coast and for a road connecting the California and Nevada highway systems.

A hard-surface program calling for the eventual expenditure of \$60,000,000 is now under consideration in Kansas. This contemplates several thousand miles of highway, connecting all the market centers and county seats in the state.

The chairman of the state roads commission of Maryland has announced that \$6,000,000 will be spent on the roads of that state, beginning immediately, provided the weather is favorable. Work stopped by the war in Utah will soon be resumed, an appropriation of \$1,300,000 already being available for the purpose.

The greatest appropriation of all, however, is in New York state, where the demands are so great as to require the expenditure of a vast sum in addition to the \$75,000,000 appropriation already being used. A million dollars will be spent during the year in Ohio, and several other states are now making up estimates for their road expenditures.

# Illinois Legislature Begins An Investigation of Prices

## Persistent Agitation Is Seriously Delaying Opening of Construction Season

**A** COMMITTEE of ten members of the Illinois State Legislature began an investigation "of the costs and profits in building materials, and whether profiteering combinations exist." The chairman of the committee, John Dailey, of Peoria, is quoted as saying: "We are after the truth, the whole truth, and nothing but the truth, and we are in condition, legally and otherwise, to get just that—the truth. We accuse no one as we start our work. But we are going to get the facts. If there has been attempted profiteering, we want to know it, and the people of Illinois are entitled to know. If present quoted prices are justified, the alleged 'trust' should welcome the inquiry."

Subpoenas have been served, or are to be served on 290 witnesses, including many of the most prominent rock product producers in the state. The committee expects the investigation to last six weeks or two months! By the usual experience in such matters a report will probably be rendered in about two years.

### Cement Prices a Target

It has been evident as the investiga-

tion developed that the committee is obsessed with a belief in the existence of a "cement trust." The Illinois Builders' Supply Association has also taken this point of view and has protested to the Attorney General of the United States against confirming the sale of the LaSalle Portland Cement Co. to the prospective purchasers, who, it is alleged, are all officers of competing cement companies. The investigating committee also wired the attorney general a like protest.

The balance of the investigation up to the time of ROCK PRODUCTS going to press was largely devoted to taking testimony from producers of sand and gravel. The only encouragement for lower prices which the committee got was to start work instead of wasting time in spilling hot air. All the witnesses made it clear that high prices were high because labor, machinery, equipment and supplies were likewise high, and the only hope for the prices to come down was to start production and give the producers a chance to determine what this season's costs would be.



# Passed By The Screen



## Personals

F. G. Pulley, well known in the sand, gravel and crushed stone fields, has ceased his editorial duties and is now studying music.

Frank Jones, general manager of the Canada Cement Co., has returned after a two months' stay in Europe with the Canada Trade Commission of which he is a member.

Zenas W. Carter has accepted the position of managing executive of the Material Handling Machinery Manufacturers' Association, having resigned as chairman of the War Service Committee on Metal Lath. His office will be at 35 West 39th street, New York.

Chester Mott, heretofore sales engineer for the Sullivan Machinery Co., Chicago, at Spokane and Chicago, has been appointed manager of the branch office at Denver, Colo., in the Equitable building. He succeeds Wallace T. Roberts, recently resigned.

Karl Minneman has resigned as purchasing agent and manager of the agricultural department of the Marble Cliff Quarries Co., Columbus, Ohio, to accept a position with the Otis Steel Co., Cleveland, Ohio. He is succeeded as manager of the agricultural department of the Marble Cliff company by P. C. Hodges, who is also traffic manager of the company.

Joseph F. Bennett, for a number of years sales engineer in Mexico, associated with the El Paso branch of the Sullivan Machinery Co., has been placed in charge of the Mexico City sales office and warehouse, which have just been established in Mexico at Edificio Oliver No. 3. Air compressors, drills and parts will be kept in stock and service given to customers in central and southern Mexico.

Cline B. Fennell has been appointed private secretary to Walter A. Zelnicker, president of the Walter A. Zelnicker Supply Co., St. Louis. Mr. Fennell, who recently returned from the Officers' Training School at Camp Pike, Ark., was formerly traveling secretary of the general superintendent of the C. B. & Q. railroad, and later private secretary to Clarence H. Howard, president of the Commonwealth Steel Co. He is president of the Junior Chamber of Commerce of St. Louis, an organization of 1,000 members of younger business men of the city.

## OBITUARY

Malcolm Gifford, president of the Gifford-Wood Co., manufacturers of wagon loaders at Hudson, N. Y., passed away March 5.

James B. Farwell, head of the J. B. Farwell Co., Oswego, N. Y., exporters of lime and cement since 1864, died March 11. He was born in Ireland and came here in 1862. From 1879 to 1911 he was also engaged in telephone and telegraph construction business. He was vice president of the Oswego County Savings Bank.

Eugene York, for many years owner of a stone quarry near Satchel bridge, about two miles north of Camden, N. Y., passed away three weeks ago in Camden. Deceased was a native of Camden and was in his 75th year. For many years he owned a farm near Satchel bridge which he conducted in addition to quarrying flag stone which for years kept him busy as flagging was then in great demand.

John Andrew Strouss, senior member of the firm of Knox, Strouss & Bragdon, Pittsburgh, Pa., died at his residence, Bellevue, Pa., March 10. Strouss was one of the oldest members of the Pittsburgh Builders' Exchange, and a member of the board of directors at the time of his death. He had been treasurer for three years, until recently when ill health compelled him to retire. Previously he had been vice-president for many years. Repeatedly he had declined the presidency because he maintained a general contractor was the logical man for the position. He was president of the Builders' Supply Club for 13 years. His birthplace was Clinton, Allegheny county, Pa. Since 1878 he was engaged in the builders' supply business in Pittsburgh.

## Sand and Gravel

The Round Top Glass Sand Co., incorporated recently with a capital of \$75,000, has started operations at Round Top, west of Hancock, Md. Charles Spalding is president.

Raymond J. Funkhouser, Hagerstown, Md., has purchased the Summers farm, near Hancock, and is erecting thereon a \$40,000 sand plant. This makes the second sand mine on Round Top in the now famous sand mining section of the county. The new concern will be known as the Maryland Sand Co.

The Automatic Gravel Products Co., incorporated by Davenport men, has purchased a 40-acre tract of land on Muscatine island, just south of Muscatine, in the heart of the gravel bed, and will soon erect a gravel plant with a capacity of 3,000 tons or 75 carloads a day. The new plant will be much larger than any in this vicinity at the present time. The company has a capital of \$60,000. Its incorporators are P. F. McCarthy, president of the McCarthy Improvement Co.; L. S. Wunder, assistant secretary of the same company, and B. H. Kelly, secretary and general manager of the Interstate Material Co. Engineers are now laying out the site which is across the road from the Northern Gravel company's plant. Construction will be started within less than 30 days. The plant will be in operation early during the summer.

## Quarries

Lee S. Good, of Race street, has leased the Ulrich stone quarries, north of Kingston, Pa. He will operate the quarries extensively to fill contracts for stone to be used in repairing roads.

George H. Westlake, Box 462, Virden, Ill., with associates is contemplating the developing of a limestone quarry in the western part of Illinois and is engaged in studying the extent of the market for the product.

Lakeside and Marblehead (Ohio) quarrymen organized with a membership of between 250 and 300 and will be affiliated with the International Quarrymen's Union of America. H. A. Ledyard of Barre, Vermont, assisted in the work of organization. Mr. Ledyard is also in charge of the organization work among the quarrymen at Kelley's Island, says a newspaper dispatch.

The Clinchfield Lime Co. of Asheville, N. C. has prepared for the future demand for agricultural limestone. According to the manager, J. W. Grimes, the company has just completed the installation of a 100-ton railroad scale at the plant at Linnville Falls, N. C., and a storage bin holding 6,000 tons of pulverized limestone with conveying belt and re-claiming outfit.

Opening of a new rock quarry five miles south of the end of Volcano lake levee (Mexico) will soon be under way, according to J. S. Nickerson, director of the Imperial Irrigation district, says the Brawley (Calif.) News. Mr. Nickerson had just returned from an examination of the ledge. "This rock is only five miles from the end of the railroad and is of the best quality for levee purposes," Mr. Nickerson said.

## Lime

Fire of unknown origin March 15 destroyed one of the lime kilns of the American Limestone Co., at Bald Hill, near Frankstown, Pa., causing a loss of \$10,000. The building and two box cars, were completely destroyed. Five kilns were damaged, along with all the buildings and quarters used by the men. The buildings will be rebuilt at once.

A plant for the manufacture of lime as fertilizer is being installed on the M. B. Wyncoop farm near Marion Center, Pa., where a fine quality of limestone will be quarried. The plant will be installed by Harry S. Wyncoop, of New York City, who has a crew of men at work opening the drift for tapping the deposit, which is from four to five feet thick. A vein of coal which covers the limestone will be mined at the same time.

## Incorporations

Lemoyne Quarries, Harrisburg, Pa. Capital, \$20,000. George E. Howard.

Seguire & Co., Inc., Portland. Capital, \$18,000. F. B. Beck, Mt. Bethel, Pa.

Laura Gravel Co., Laura, O. Capital, \$10,000. Samuel Dull.

Marengo Lime Stone Co., Marengo, Ind. Capital, \$35,000. Quarry. Directors: Henry G. Roetzel, Charles L. Hart, Jasper H. Thornsburg.

Rampus Stone Co., Knoxville, Tenn. Capital stock, \$25,000. Incorporators: C. B. Strachan, R. S. Campbell, J. M. Houser, Thos. McCroskey and Chas. M. Seymour.

Jefferson Farms, Inc., Gardiner, N. Y. Real estate, own and operate farms, deal in live stock, all kinds of mercantile, contracting, agricultural, logging, mining, quarrying, etc. Capital, \$50,000.

Standard Investment Co., Muscatine, Iowa. Capital, \$20,000. Quarry and manufacturing stone; deal in sand, gravel, earth, stone and ice. Incorporators: W. B. Randall, S. H. Hoffman, H. Rauch, Muscatine, Iowa.

Stillwell Sand and Gravel Co., Anderson, Ind. Capital, \$100,000. To mine and excavate for gravel. Directors: Thomas N. Stilwell, E. N. Hill, N. M. McCullough, Rex D. Kaufman and Wade H. Free.

Superior Sand and Gravel Co. of Charleston, to operate sand and gravel plant at Clendenin, W. Va. Capital stock, \$50,000. Incorporators: Frank Kerns, W. C. Delaney of St. Albans; D. J. Vaughn, J. W. Whartenburg and John S. Sheppard of Huntington, W. Va.

Melrose Quarries Co., St. Cloud, Minn. Capital, \$500,000. Purpose: Quarrying and manufacturing of granite and other stone. Incorporators: John Luckemeyer, president; Anna Luckemeyer, vice president; Wm. J. Bohmer, secretary-treasurer; J. H. Reed, all of St. Cloud; Henry Kalkman, Melrose.

Allen-Duluth Development Co., Duluth, Minn. Capital, \$100,000. Purpose, mining and refining ores or minerals, working coal mines and stone quarries. Incorporators are H. A. Carmichael, president; Arthur W. McMillan, vice president; Agnes Carmody, secretary; Janet Macaulay, treasurer; L. A. Grotke, Edith Sundholm, all of Duluth.

The Alvord-Wichita Stone Co., Alvord, Texas, incorporated. Capital, \$35,000. Object, to develop a stone quarry three miles from Alvord. Among the stockholders are J. P. Foty, W. A. Covington and Oren Speer, all of Alvord. Machinery and equipment for operating the quarry will be installed. The company has acquired the quarry rights to a tract of 60 acres of land from L. E. Pillars.

## Cement

The Abbott-Converse Co. of Houston, Texas, has adopted plans for the construction of a plant there for the manufacture of high temperature cement. L. C. Converse is vice-president of the company. No details are available at this time.

Herman Smith and Frank Livingston are starting a plant at Randolph, Wis., for the manufacture of concrete tiling, and will put considerable money in the project to acquire the latest machinery.

The strike instituted by workmen at Plant No. 3 of the Lehigh Portland Cement Co. several weeks ago, has been settled and the 260 men employed at the plant have returned to work on terms proposed by the company.

At the request of the Dominion Trade Board an investigation into the possibility of recovery of potash salts from the waste flue gas of cement plants is being undertaken in Canada. In the past Canada has produced small quantities of materials containing potash, not in any way meeting her demand, and it is thought likely that by saving what is wasted in the operation of cement plants the country may make at least a step towards independence.



## Retail Dealers

Boyd Produce Co., Boyd, Wis., has increased its capital from \$10,000 to \$40,000. Dealers in cement, lime, etc.

Clover Leaf Lumber Co., Wausau, Wis. J. J. Adams, S. E. Hutchins, C. A. Cowee. Capital, \$10,000. Dealer in cement, tiles, sand, etc.

Elastic Stucco Co., Milwaukee, Wis. Capital, \$15,000. Business of dealing in stucco and building materials. James W. Arnold, Jacob Arnold, A. J. Moll, incorporators.

The Retail Lumber & Supply Co., Shawano, Wis. Dealers in cement, building materials, etc. Change of name to Retail Lumber & Supply Company. This company is also enlarging its scope of business to include logging, operating elevators, etc.

Northern Lumber & Supply Co., Wausau, Wis. Capital, \$40,000. Dealers in cement, sand, etc., in addition to their regular lines of lumber, etc. G. R. Wilson, E. C. Dawley, R. E. Puchner.

Attorneys: Kreutzer, Bird, Ononeski & Puchner, Wausau, Wis.

Clifford Lumber Co., Stevens Point, Wis., capital, \$75,000. J. Wm. Clifford, Chas. F. Thoms, Nettie Clifford. Retail lumber and building supplies.

Laun Brothers Co., Wausaukee, Wis. Capital, \$100,000. Retail lumber and building materials, including cement, etc. Mary R. Laun, H. G. Laun, L. B. Laun, incorporators.

Winnebago Ice & Coal Co., Oshkosh, Wis. Capital, \$25,000. Wholesale and retail building materials in addition to regular lines. John Lehnigk, Fredo Lehnigk, John E. Glatz.

Wauwatosa Fuel & Supply Co., Wauwatosa, Wis., incorporated. Fuel and building supplies (cement, lime, etc.) Chas. C. Jacobus, Garritt L. Jacobus, Chas. B. Perry, incorporators.

Concrete Specialty Manufacturing Co., Milwaukee, Wis. Capital, \$4,000. Irving G. Bretzel, Herman J. Bretzel, Aug. Jurkschat, incorporators. Manufacturing building materials and "fixtures."

Chas. J. Weaver, attorney, 100 Wisconsin street, Milwaukee.

Home Building Supply Co., Milwaukee, Wis. Capital, \$25,000. John M. Schneider, Michael Schneider, Emil C. Deinlein. Dealers in cement, roofing compositions, brick, etc.

William A. Jepson Corp., Boston. Deal in coal, coke, minerals, oils, etc. Capital, \$100,000. Directors: Wm. A. Jepson, president; Wm. B. Harris, Philadelphia, Pa., treasurer, and Mabel Macgregor.

For the one-day convention at Boston, February 27, 1919, the New England Builders' Supply Association published an official program that is annual not only in its immediate purpose but in the scope of its contents. The book, one of size and general attractiveness, is handsomely done, nicely edited, and that its contents were carefully selected for useful and informative purpose is evident. Some of the articles are an "Outline of the Government's Policy," "Proposed Definition of Dealer," "Restoration and Construction Activity of the Government" and "The Wage Problem."

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25 acres No. 1 HIGH GRADE GLASS SAND. at Berkeley Springs, W. Va., B. & O. R. R.

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**N. Q. SPEER**

Berkeley Springs

West Virginia

FOR SALE—Crushed stone plant near Wymore and Blue Springs, Neb., on Union Pacific and C., B. & Q. railroads; the quarry farthest west in Nebraska or Kansas; 40 ft. of stone; light stripping; large territory; good prospects; 67 ft. of shale under quarry bed. Ideal location for fancy brick or Portland cement plant. Address G. H. Davis, Blue Springs, Neb.

FOR SALE OR LEASE: Crushed stone quarry situated near Wilkes-Barre, Pa. Very hard green sandstone, practically equal to trap rock for road material. Quarry equipped to produce five to six hundred tons per day—has frequently run eight hundred. Ample rail facilities and an extensive market. For detailed information communicate with Arthur L. Stull, 182 S. Franklin St., Wilkes-Barre, Pa.

FOR SALE—40 acres sand and gravel on river and track. T. A. Kelty, Owner, Cedar Rapids, Iowa.

## FOR SALE

Stone Quarry—22½ acres at Lannon, Wis., 17 miles from Milwaukee on the C. M. & St. P. R. R. Nine buildings, gyratory crusher, pumps, screens, etc.; fully equipped for business. Will sell cheap. Address

WISCONSIN STONE CO.  
544 Hartford Ave. Milwaukee, Wis.

The advertiser wants to know that you saw his ad in ROCK PRODUCTS

WILL SELL—The largest and best sand and gravel deposit in this section of the country, affording by reason of its superior location a facility and economy in mining and marketing unsurpassed—a farm of 84 acres, lying about five miles North of New Castle, Pa., with a railroad frontage of over 1,600 feet, skirting the bank of the Shenango River. Joint railroad service by the Erie and the P. and L. E. Railroads, providing direct shipments to the splendid markets of New Castle, Sharon, Youngstown and surrounding points. An inexhaustible supply of water at all seasons for the operation of a plant of any capacity. Altogether an ideal proposition, as it embodies a deposit of inexhaustible supply of comparatively no stripping, of exceptional quality, which by virtue of its elevation above the railroad permits the economies of gravity methods in mining. We do not offer this property as a mere find, but the result of an expert search through a large section of this territory for just what we know it to be. The property if not sold will be developed by us as soon as the cost of plant installation and stability of the market warrants the expenditure. The Youngstown Construction Company, Realty Trust Building, Youngstown, Ohio.

## STONE QUARRY

For rent, at sight, 920,000 cubic meters of stone, switch connection with Havana Central R. R.; at San Francisco de Paula. For further information address

**M. A. GLYNN**

San Francisco de Paula

Habana

## Help Wanted

## WANTED

First class Master Mechanic for cement mill. Must have had experience in all departments of cement manufacture and be good at handling men.

Box 1301

Care of Rock Products

WANTED—Superintendent for gypsum plant. State experience, salary, age, and furnish references. Address Box 1298, care Rock Products.

WANTED—Engineer with knowledge of handling electrical power for plaster mill; must have references. Address Box 1299, care Rock Products.

WANTED—Experienced crushing plant millwrights. Steady positions for right men. State experience, age and wages expected. Buffalo Slag Co., Buffalo, N. Y.

## WANTED

First class quarry foreman experienced with limestone or cement rock. Must be able to get and keep labor and get output from both hand loaders and steam shovels. State experience and salary wanted in first letter.

Box 1300

Care of Rock Products

## Situations Wanted

GENERAL MANAGER OR SUPT. desires engagement where careful and efficient operation is essential to increased production. Twenty years experience in heavy operations. Proven ability. Excellent references. Address Box 1290, care ROCK PRODUCTS.

WANTED—Position with first-class people. Fifteen years electrical work and steam engineering. Two years Supt. of sand and gravel pumping plants. Address C. H. Robertson, 218 College St., Alliance, Ohio.

SITUATION WANTED—Gen. Mgr. or Supt. desires engagement where efficient operation is essential to increase production. 15 years' experience in operating and demonstrating rotary kilns. Can furnish best of references. Address L. J. P., care ROCK PRODUCTS.

WANTED—Position as quarry supt. 16 years' experience. Familiar with latest methods. Designing and mechanical ability. Proven ability. At present employed. Address Box 1302, care ROCK PRODUCTS.

## Employment Agencies

## Men Finders — Position Getters

Cement Mill Supt., \$225; 2 Chief Chemists, \$175-200; 3 Jr. Chemists, \$85-100; Mill Elect., \$175; Chief Opr. Engr., \$200; Timekeeper, Payroll Clk., \$125.

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